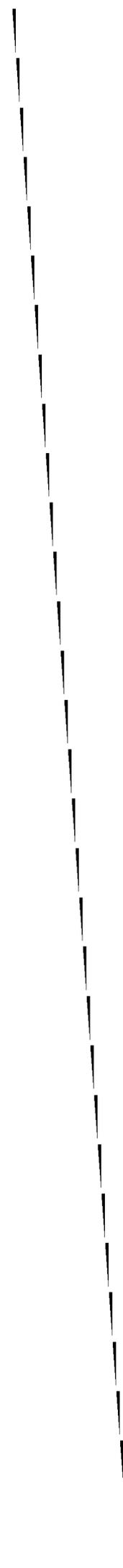


COMMITTEE
ON
POPULATION AND
DEMOGRAPHY

REPORT NO. 16

**Determinants of Fertility
in Developing Countries:
An Overview and
A Research Agenda**

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Determinants of Fertility in Developing Countries: An Overview and A Research Agenda

Panel on Fertility Determinants
Committee on Population and Demography
Commission on Behavioral and Social Sciences
and Education
National Research Council

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This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee consisting of members of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine.

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PREFACE

This is the second of two volumes that review the research evidence about determinants of fertility differentials and fertility change in the developing countries. The preceding volume provides an exhaustive review of specific fertility determinants. This volume gives a brief overview of the findings and an agenda for further research.

Fertility and its determinants have been urgent topics for research in recent decades with the rapid expansion in world population. Attempts to control population growth have focused on reducing fertility, with some apparent effect. The peak rate of growth in the world's population has now been passed, but growth is still at a high level in almost all the developing countries. In absolute numbers, the increase in the world's population continues to rise; according to United Nations medium projections, more people will be added each year for the next 50 years than were added in 1980. Long-term trends in population therefore still pose considerable problems.

These volumes are an attempt to summarize and integrate scientific knowledge about the determinants of the fertility levels that contribute to continued population growth. It was prepared by the Panel on Fertility Determinants of the Committee on Population and Demography. This panel was created by the Commission on Behavioral and Social Sciences and Education of the National Research Council in response to a request from the Agency for International Development to assess research in this area and make recommendations for further work. In addition to this report, the panel has prepared studies of several developing countries and a few illustrative cross-national analyses.

Part of the background for the panel reports was provided by previous work of the Committee on Population and Demography and its other panels to pin down actual fertility levels and trends in selected developing countries; this work, also supported by the Agency for International Development, is detailed in a series of country reports from the National Academy Press, and the demographic methodology developed for this purpose is laid out in a volume issued by the United Nations.

The causes of fertility reductions in some developing nations, as well as the causes of continued high fertility in others, are strongly

debated. What contribution is made to lower fertility by such factors as lower infant mortality levels, improvements in the status of women, and spreading knowledge of and access to efficient methods of contraception and abortion, and what contribution is made to higher fertility by such factors as cultural and religious norms, the economic benefits children provide, and traditional reluctance to interfere with reproduction--all these matters continue to be investigated by researchers in several fields. To encompass such research, the panel was of necessity a heterogeneous group, including scholars from several disciplines: anthropology, demography, economics, epidemiology, psychology, sociology, and statistics. This report contains many perspectives, generally congenial but occasionally contrasting, held together, one would like to say, by a carefully crafted framework, though an act of will may be at least part of the truth.

To design and prepare the report, the panel formed a working group composed of Ronald D. Lee (chair), Paula E. Hollerbach, John Bongaarts, and Rodolfo A. Bulatao. This group drew upon the analytical framework prepared by a separate working group (chaired by Ronald Freedman), devised the scheme for the volume, and, with much advice and suggestions from the panel, solicited the help of 42 authors to prepare the individual papers of the report.

Each author received an early version of the analytical framework and a description of that part of it he or she was expected to develop. It is an indication of the good sense of this group that, working within this imposed structure, they were able to focus on substantive problems and summarize important areas of research.

The papers were reviewed, often unmercifully, at several levels. The working group reviewed all the papers and panel members reviewed papers in their areas, in many cases suggesting extensive improvements that authors took with surprisingly good grace. At the working group's request, additional reviews were carried out by other researchers, including Bryan Boulier, Mead Cain, Ruth Dixon, Peter Lindert, Geoffrey McNicoll, Eva Mueller, Dorothy Nortman, Toni Richards, Michele G. Shedlin, Christopher Tietze, and Hania Zlotnik. For the panel's parent Committee on Population and Demography, Conrad Taeuber and Samuel Preston undertook the daunting task of reviewing the entire collection. This volume was also reviewed by the Commission on Behavioral and Social Sciences and Education. The sum of these reviews was a considerable improvement, for many of the papers, in concept and precision.

Ensuring that the mountain of often dense scientific prose in fact contained readable English sentences was mainly the responsibility of Rona Briere, who performed this task with vigor and understanding. Carol Bradford Ward assisted in keeping all the pieces of the work together and moving on track. Elaine McGarraugh handled production editing details. Among several who worked at the alternately intriguing and boring task of typing and correcting drafts, Carole Turley and Solveig Padilla deserve special acknowledgment.

Finally, although the views expressed in the papers are those of the authors rather than of the organizations with which they are

affiliated, those organizations nevertheless contributed considerably by making time and resources available. Their incalculable contribution is hereby acknowledged.

W. PARKER MAULDIN, Chair
Panel on Fertility Determinants

Chapter 1

AN OVERVIEW OF FERTILITY DETERMINANTS IN DEVELOPING COUNTRIES

Rodolfo A. Bulatao and Ronald D. Lee

This chapter summarizes the research evidence about fertility determinants in developing countries presented in the 38 papers in the companion volume, Report No. 15, Determinants of Fertility in Developing Countries: A Summary of Knowledge. The goal here, as in the companion volume, is not to break new ground, but rather to provide an analytically organized and balanced overview of what is already known, emphasizing empirical findings rather than theory.

The organization of this chapter follows that of the companion volume. First, it reviews the analytical framework presented in Chapter 1 of Report No. 15. Expanding on the categories provided by the framework, the discussion below then considers, in order, the supply of children, the demand for children, the fertility decision process, fertility regulation and its costs, nuptiality patterns and their effect on fertility, and the influence of social institutions.

Though this chapter does involve some selective sampling and interpretation, most of the information and evidence is drawn directly from the papers in Report No. 15. Passages that follow individual papers particularly closely (in some cases verbatim) are referenced. It is, of course, impossible to provide full references in a chapter of this sort; for comprehensive bibliographies the reader is referred to the papers themselves. Abstracts of the 38 papers appear as the Appendix to this report.

THE FRAMEWORK

To organize knowledge about the complex interacting influences on fertility in the less developed countries (LDCs), a conceptual framework was developed. The framework groups influences on fertility according to three channels through which they operate: demand, supply, and regulation costs. "Demand" here refers to the family size and composition a couple would choose, abstracted from all concern with the childbearing process required to attain that outcome. Demand has many dimensions, such as number, gender, and spacing of surviving children. "Supply" refers to the surviving children couples would have if they did not regulate their fertility, or their children's survival, in parity-specific ways. Supply depends on natural

fertility, which in turn reflects biology, culture, socioeconomic circumstances, and to some degree individual choice; supply also depends on child survival and on nuptiality patterns. The interaction of demand and supply considerations presumably determines whether and how strongly a couple wishes to have or to avoid a birth. Whether they actually take any steps to avoid it depends in addition on how undesirable or inaccessible contraception and induced abortion are. This latter kind of influence, referred to as "regulation costs," includes such considerations as the difficulty of obtaining contraceptive information, distance to a family planning clinic or other source, religious or moral attitudes, and perceived health consequences.

This three-part framework is developed at the level of the couple or household, on the assumption that actions by couples are ultimately crucial. At the community or societal level, fertility is the sum of the outcomes for numerous couples; influences on community and societal fertility, therefore, can also and will be treated within the categories of the framework.

The framework can accommodate all hypothetical influences on fertility; indeed, past fertility research appears to fall rather naturally into these three categories. Other means of categorizing past research are of course possible, but the present approach appears to be the most comprehensive and coherent of those so far suggested and allows treatment of research across disciplines. Although this framework may seem at first to assume an economic model in which couples make optimizing decisions, in fact no such assumption is necessary; indeed, "demand" and "supply" as used in the framework are only loosely related to the corresponding economic concepts. In principle, any particular influence--such as social norms, cultural practices, or nutrition levels--might dominate the fertility outcome.

For some purposes, it is useful to take the bold step of elevating the three categories to the status of variables which summarize in a single number the totality of subsumed concerns and influences. Such a "strong" version of the framework--as illustrated in Figure 1, for instance (following Easterlin, 1978)--amounts to a refutable theory and offers a distinctive view of how various influences interact to produce fertility outcomes. This version greatly simplifies the framework by implicitly ruling out certain kinds of interactions, thereby simplifying empirical work as well. However, it is not yet known whether the necessary assumptions are empirically appropriate; the framework is used here, therefore, primarily as a rough classification scheme, avoiding these substantive assumptions.

Any framework necessarily involves simplification, with some gain in clarity but also the risk of arbitrary or misleading structuring. Various key issues about the framework, such as the question of whether couples make fertility decisions and whether these are one-time or sequential decisions, are discussed in Chapter 1, and some points about these issues are reviewed below. The framework may tend to direct attention away from some fruitful lines of inquiry, such as the study of deliberate spacing of children (Page and Lesthaeghe, 1981; United Nations, 1981), the substitution of modern contraceptives for

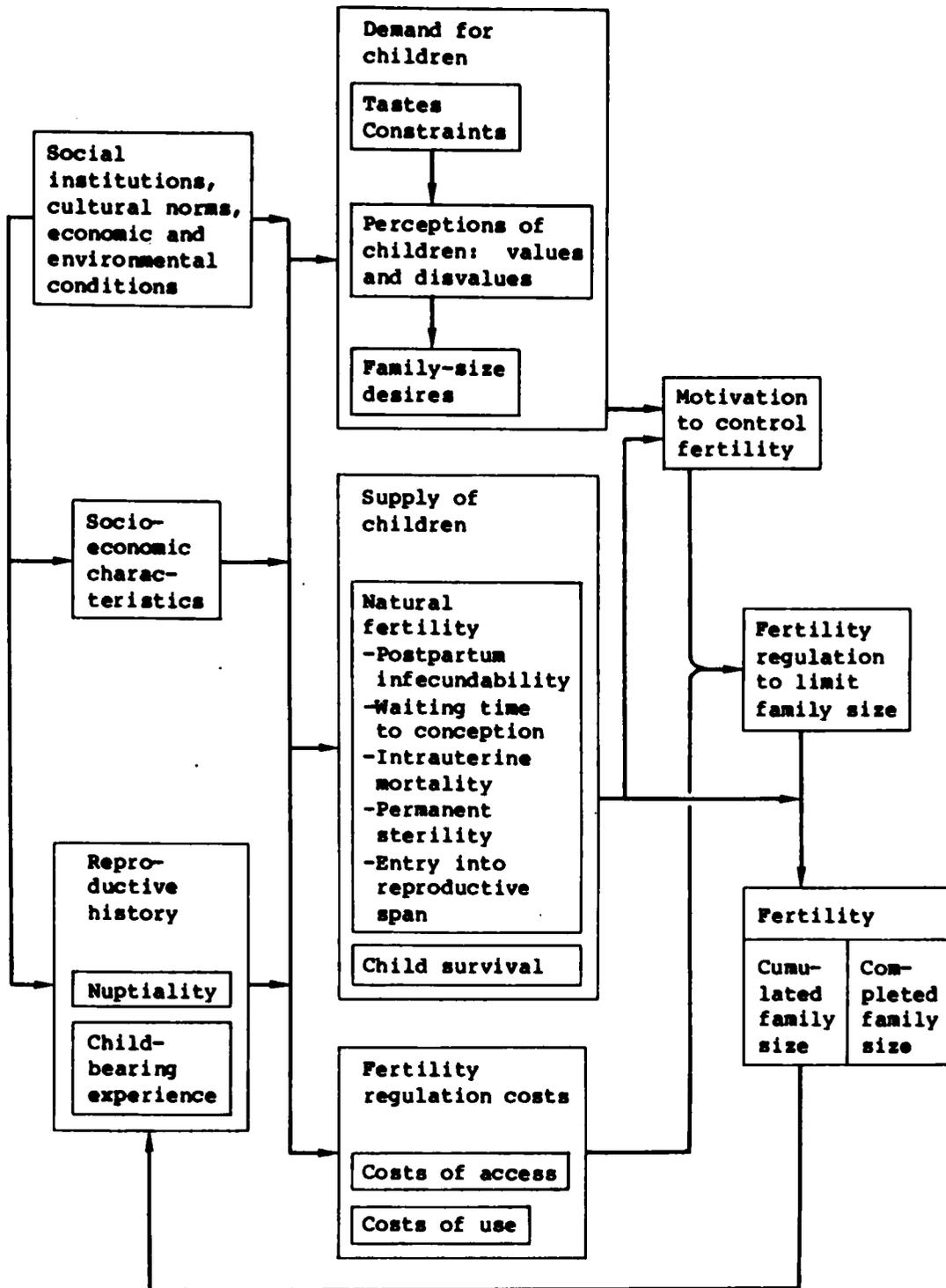


FIGURE 1 One Possible Representation of the Interrelationships Among the Basic Components of the Framework

traditional means of spacing, and the use of marriage delay as a family limitation strategy. To compensate for such possible biases, some explicit attention is paid to such areas either in the sections below or in the following chapter.

THE SUPPLY OF CHILDREN*

The supply or potential output of children is defined as the surviving children a couple would have if family size were not deliberately limited. Supply thus depends directly on levels of natural fertility and child survival, and indirectly on the background variables which influence these levels. In contemporary more developed countries (MDCs), demand is well below supply, and is the principal determinant of observed fertility given the relatively low cost of fertility regulation. In contrast, in many poor developing countries, as well as in historical societies, the situation is unclear: demand may approach or exceed supply, or couples may not formulate any effective fertility goals, or fertility regulation may be thought too difficult or not considered at all. Fertility in these societies is determined primarily by supply factors, and natural fertility obtains.

The sections that follow review the evidence regarding the two direct determinants of the supply of children--natural fertility and child survival--and their effects on supply trends.

Determinants of Natural Fertility

Natural fertility prevails in the absence of deliberate attempts to limit family size; since this is difficult to observe directly, the absence of any parity-dependent limitation behavior, or the absence of any use of contraception or abortion, may be taken as approximations. Natural fertility is a function of both behavioral and biological proximate determinants through which background variables, including socioeconomic factors, health, and nutrition, operate. The proximate determinants were first identified independently by Henry (1953) and by Davis and Blake (1956). Slightly modified, Henry's approach yields the following set of five proximate determinants of natural fertility: (1) postpartum infecundability; (2) the waiting time to conception; (3) spontaneous intrauterine mortality; (4) the onset of permanent sterility; and (5) age at marriage (or at onset of exposure to intercourse) and marital disruption. Natural fertility differences among populations and trends in natural fertility can always be traced to variations in one or more of these five proximate determinants.

Although each of the five does affect natural fertility, their quantitative impacts are quite unequal, as shown in the sensitivity analysis displayed in Figure 2. A standard value of 7 may be assumed

*The initial draft for this section was prepared by John Bongaarts and Jane Menken.

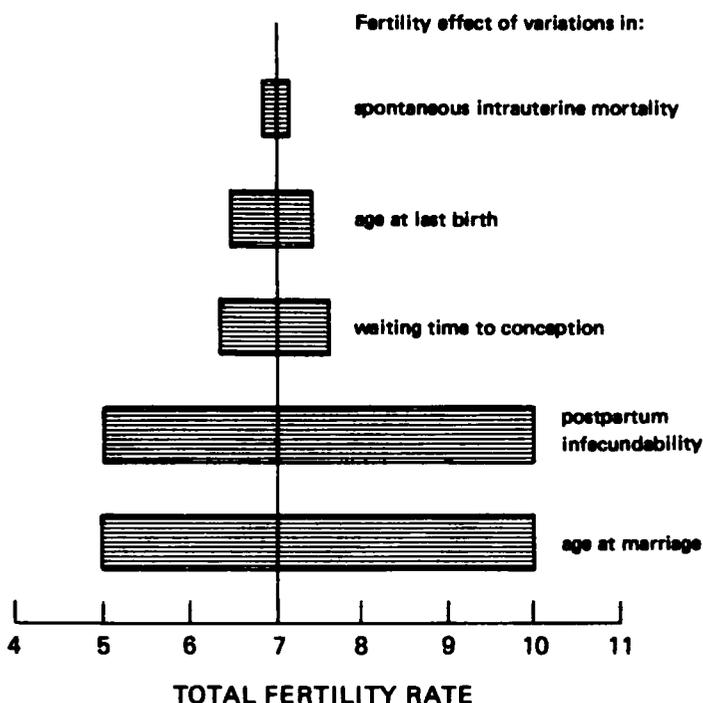


FIGURE 2 Variations in the Total Fertility Rate Induced by Variations in Five Proximate Determinants of Natural Fertility

for total fertility in a natural-fertility setting. If each proximate determinant is varied individually, holding the other determinants fixed, this value for total fertility will be affected. Each bar in the figure shows the range of variations in total fertility that can be expected from varying each determinant across its observed range in populations of the world (though these variations are not equally likely). It is clear that variations in age at marriage and in postpartum infecundability dominate the other sources of natural-fertility variations in this exercise (Bongaarts and Menken, in companion volume).

Marriage age and its determinants will be discussed in a later section. As for postpartum infecundability, this primarily reflects variations in breastfeeding practices: in the intermediate range of breastfeeding durations, each additional month of breastfeeding adds over half a month to postpartum amenorrhea (Bongaarts, in companion volume). This rough estimate does not take into account variations in intensity of breastfeeding, which have considerable effect. In certain cultures, culturally induced restrictions on postpartum sexual intercourse are also important in extending the infecundable period.

The influence of background variables on natural fertility, starting with nutrition and health, may now be considered. Although the subject has been controversial, the bulk of the evidence now indicates that the moderate chronic malnutrition that is found in many

parts of the developing world has only a small physiological impact on fertility. Although famines unquestionably lead to significant fecundity impairments, this is apparently not the case for moderate chronic malnutrition. Several studies have indicated that poorly nourished women may have later menarche (perhaps by two or three years) and that they have slightly shorter postpartum amenorrhea intervals (typically by one or two months). However, since the fertility effect of each of these factors is small, chronic malnutrition is not a major fertility determinant.

With regard to the physiological links between health and fertility, Gray (in companion volume) points out that malnourishment and ill health frequently occur together and interact. He nevertheless concludes that only severe morbidity is likely to inhibit reproduction, at worst affecting a minority of disadvantaged women. There is one important exception: the pelvic inflammatory diseases that are almost certainly responsible for high levels of primary and secondary sterility and consequent low fertility in some areas, especially in parts of Africa where venereal disease is widespread. However, it must also be noted that low natural fertility in some settings may result from deliberate spacing of births in response to poor health and nutrition conditions (Knodel, in companion volume).

Turning to socioeconomic and cultural influences on natural fertility, the critical behaviors to address are breastfeeding and postpartum abstinence (Nag, in companion volume). Research into the way these influences affect variations in breastfeeding and therefore in amenorrhea is a rather recent response to recognition of the overriding importance of lactation as a determinant of fertility in the developing world. It is now generally accepted that, in many areas, breastfeeding becomes shorter and less frequent as education increases; is higher in rural than in urban areas; and exhibits marked differences across regions and ethnic groups (Nag, in companion volume). Although the role of changing economic pressures and labor force participation in determining breastfeeding practices is not well understood, there is considerable concern that the net effect is increased pressure to reduce lactation (Lesthaeghe, 1981). Controversy remains over whether the availability and advertising of infant formula encourages earlier supplementation and weaning, resulting in deleterious effects on the infant and contributing to an increase in natural fertility. In general, mounting evidence from widely separated parts of the developing world shows that declines in breastfeeding are taking place, and these will cause fertility to rise unless countered by major increases in the use of contraception or other methods of fertility control.

Cultural influences are also important determinants of variations in postpartum abstinence. It has long been known that sexual intercourse may be restricted for cultural reasons during lactation, as in many societies in sub-Saharan Africa. Recent research has shown that, in some settings, postpartum abstinence is used by couples deliberately to space births for the health of both the children and the mother (Knodel, in companion volume). Available survey data indicate that postpartum abstinence is negatively associated with education, urbanization, and contraceptive use (Nag, in companion volume).

Determinants of Child Survival

Considered next are influences on child survival, which has improved considerably in recent decades. It is recognized that infant and child mortality varies with the mother's age and parity; both parents' socioeconomic status, including education and income; the adequacy of drinking water; the availability of health care and the control of disease; nutrition; and a host of other factors. Yet there is some disagreement about the relative importance of these mortality determinants in the world today. Two views in particular are opposed: one asserts the primacy of "social action and technological change," the second the primacy of "socioeconomic modernization" (Chen, in companion volume). Since infant and child mortality remain high in many developing countries, it is especially important to understand the factors involved, and to assess how these can be changed to promote improved survival.

The Trend in Supply

Natural fertility and child survival together determine the supply of children; both factors vary widely among populations and over time. Their influence on the supply of children can be seen by considering supply trends over the course of a hypothetical demographic transition. The natural total fertility rate may rise from 5 or 6 to about 10 during the transition, primarily because breastfeeding is largely abandoned. (However, actual fertility at the end of the transition is much lower because most couples deliberately control their fertility.) Accompanying this trend in natural fertility is a sharp improvement in survival; an increase in life expectancy from 25 to 75 implies that the proportion of births surviving to age 20 rises from under 50 percent to about 98 percent. The combined effect of these trends in natural fertility and mortality is roughly a fourfold increase in the supply of children, as measured by the number surviving to age 20. Clearly, increased natural fertility and improved child survival, whose effects are roughly equal in this example, can result in very large changes in supply.

THE DEMAND FOR CHILDREN

Advances in the understanding of natural fertility like those just reviewed, together with better understanding of the effects of access to modern contraception, have improved the ability to explain the timing and pace of fertility decline, as well as apparently deviant cases of rising fertility. Nonetheless, the demand for children still remains at the heart of most explanations of fertility decline in response to modernization. Inevitably at some stage in the transition, and probably fairly early, change in demand becomes a key factor, if it has not been one all along. It may be asked, of course, whether the concept of demand has any meaning in pretransition

populations. In fact, the available evidence, though far from conclusive, suggests that it does: most survey respondents are able to answer questions about family-size desires and justify their responses, although this may not be true in all societies. Related issues, such as whether demand can be measured (McClelland, in companion volume), how it depends on the identity of the decision maker within the family (Hollerbach, in companion volume), and how it relates to behavior (Pullum, in companion volume) have not been entirely resolved.

Like supply, demand refers to surviving children. It is assumed that couples generally set goals in regard to the family size they want to achieve, rather than the number of births necessary to achieve it. However, improvements in child survival do not lead to perfectly offsetting decreases in births, because mortality also has some influence on demand for surviving children. Several studies show that losing a child increases a couple's desired number of additional births. This effect varies by sex of the deceased child and by achieved parity; however, it is less than unity, so that couples on the average do not completely make up for the lost children. Strictly interpreted, the evidence suggests that the experience of child mortality, while increasing the number of desired births, reduces the demand for surviving children (Heer, in companion volume). There is also quite limited evidence that perceived, as opposed to experienced, child mortality also has a positive effect on the desired number of births.

The four main classes of factors affecting demand may now be discussed: the direct economic costs and benefits of children, their opportunity costs, the effects of income and wealth, and norms and tastes for children.

Direct Costs and Benefits of Children

The direct economic costs and benefits of children are important considerations for parents in high-fertility developing countries, as many attitudinal studies have shown (Fawcett, in companion volume; Bulatao, 1979). General financial and practical assistance and expected help in old age are among the most frequently cited advantages of children, rivaled only, in some cases, by concern with preserving the family name or line. The same surveys also show that direct financial costs are the predominant disadvantage attached to having children in LDCs. Instrumental benefits are of much less concern in MDCs; within both LDCs and MDCs, they are less important in urban than rural areas. Whether positive or negative, the net value of a child varies, among other things, by sex, number of siblings, size of landholding, the extent to which other institutions provide substitute services, the nature of labor markets, the desired level of expenditures on the child, and the extent to which costs of children can be passed on to a larger social group.

Painstaking time-use studies, particularly in Asia, have in the last decade begun to give us a picture of what children actually

contribute economically. Although children in some settings begin quite young to contribute many hours in agricultural labor and housework, the cumulative value of these services (averaged across sex) typically does not compensate for their cumulative consumption before leaving home (Lee and Bulatao, in companion volume; Cain, 1982). Children also provide other services, such as old age support and insurance against risk. Unfortunately, in the absence of acceptable market substitutes, it is not possible to assign a money value to these services. If they were valued according to the cost of providing them through efficient institutions (which, for example, would yield a positive return on investments for old age security), it is clear that they would be worth relatively little, and children's net economic contribution would still be negative. However, in the absence of such institutional alternatives, these services may be extremely valuable (Caldwell, in companion volume).

Time Costs of Children

There is little direct evidence on the time costs of children in LDCs; nonetheless, it appears that these time costs are of much less consequence in LDCs than in MDCs, where they have often been stressed as the central influence on fertility. Attitudinal studies have shown that MDC women frequently report "feeling tied down" as an important cost of children; this is rarely so in LDCs (Fawcett, in companion volume). Compatibility between childbearing and work on the farm reduces time costs in agricultural settings, as does the availability and acceptability of parental surrogates (Oppong, in companion volume). Indeed, children in LDCs are often net suppliers of time, rather than net consumers, and a general rise in wages may therefore initially raise the net value of children (Lindert, in companion volume).

During the course of modernization, time costs presumably become increasingly important in determining demand. It is not surprising, therefore, that the empirical association of fertility and female labor supply in LDCs is sometimes positive and sometimes negative (Standing, in companion volume); likewise, higher female wage rates in LDCs are sometimes associated with higher, rather than lower, fertility.

Income and Wealth

In principle, whether children are net producers or net consumers, higher income or greater wealth should make them more affordable and therefore increase demand for surviving children, with a subsequent increase in the number of desired births. However, income increases may lead to a demand for higher quality in children rather than a larger number. Furthermore, higher incomes provide parents with access to substitutes for child services which would tend to mitigate the rise in the demand for surviving children. Finally, higher

incomes may lead in various ways to a change in tastes away from children toward competing material goods. Perhaps as a consequence, the evidence on the effect of income on demand is inconclusive (Mueller and Short, in companion volume). It is striking that studies have consistently found fertility to be positively associated with size of landholding, and perhaps with rural incomes generally; whether this reflects an influence of income on demand, supply, or regulation costs is unknown (Mueller and Short, in companion volume).

Tastes and Norms

In addition to economic costs, benefits, and resources, it is necessary to consider norms, tastes, or personal preferences for children in contrast to preferences for other goods or services. Although norms have frequently been identified as central to understanding fertility behavior, there is an absence of any direct supporting evidence (Mason, in companion volume). Similarly, the evidence for the influence of tastes is inferential, since no direct attempts have been made to measure them in LDCs. Although parents' reports of the psychosocial values and disvalues attached to children imply considerable variability in tastes, the sources of this variability remain obscure. Tastes seem to vary across religious, linguistic, and other ethnic boundaries; whether they vary similarly across social classes is difficult to determine. Tastes are also affected by exposure to new consumer goods.

The Trend in Demand

Modernization radically alters the demand for children. First, children's economic contributions fall off considerably, as education gains in importance, as the tasks children do become obsolete or unnecessary, as the labor force shifts out of agriculture, as children are replaced by other institutions providing security against risk or old age, and as greater social mobility and weaker family ties reduce dependence on children. Second, direct costs of children rise in monetary terms, although incomes are also rising. There does in fact seem to be less concern about direct costs in later stages of development, possibly because of the improved financial situation of the typical household. Time costs, on the other hand, become heavier with modernization: substitutes for parental care become more costly, jobs become less compatible with childbearing, and the value of parental time rises. Time costs may therefore begin to have a significant effect in the later stages of modernization. The effect of rising incomes is not clear, since they are offset by rising costs and by various indirect effects, mainly negative, on demand. Finally, tastes may change against children and in favor of new material goods, including those necessary for better child quality, although other factors in tastes, such as those based on ethnic differences, may remain largely unaffected (Lee and Bulatao, in companion volume).

There are few good estimates of the magnitude of the resulting changes in demand. Taking survey measures of family-size desires to reflect demand, two illustrations of apparently falling demand may be noted: data for Taiwan show a drop from 4.0 to 2.8 in preferred number of children between 1965 and 1980 (Chang, Freedman, and Sun, 1981); data for South Korea show ideal family size falling from about 5 to about 2.5 in the last two decades (Cho, Arnold, and Kwon, 1982). In both cases the fall is exceeded by the fall in total fertility; however, surveys in other countries currently show larger preferred numbers (between 6 and 9 in several sub-Saharan countries [Lightbourne et al., 1982]) than the initial levels in these two cases.

FERTILITY DECISIONS

Given an expected supply of children and some concept of demand, how does a couple go about making a fertility decision, or possibly avoid a decision? Some researchers see a couple's response to their supply-demand situation as entirely shaped by cultural norms; others prefer to see it as involving a multitude of deliberate decisions; still others divide couples according to these two levels of response. This section identifies different strategies a couple may use in fertility decision making in an attempt to synthesize the limited evidence, and then discusses the couple interaction involved.

Six Strategies

A couple may use six different strategies, either singly or in combination. First, in what may be considered the null case, if there is no significant imbalance between supply and demand, no action is necessary. Of course, other fertility-related decisions are made--on marriage, on breastfeeding, on separation, and so on--though these generally do not result from the supply-demand balance and are typically not directed to controlling family size.

The other five strategies are activated only if there is some significant imbalance between supply and demand. The second strategy is to misperceive or deny such imbalance, as illustrated by a couple's rationalizing an unexpected birth or misperceiving the probability of an unwanted pregnancy or the likelihood of having a son or a daughter. The third strategy is to do nothing, recognizing the imbalance but "tolerating" it, perhaps out of passivity or fatalism. There may be various reasons for passivity, such as limited information about or high costs attached to fertility regulation, ambivalence about decision consequences, or a general feeling of powerlessness over one's life. Fatalism of this sort may be the dominant mode in environments of capricious productivity, high mortality, authoritarian politics, rigid stratification, and widespread poverty (Hull, in companion volume).

By contrast, the fourth strategy involves active coping: making a conscious, considered attempt to deal with imbalance, deliberately

seeking to make the best of the situation or maximizing the utility derived from it. This involves applying some decision rule (Hollerbach, in companion volume); some suggested rules have been shown to predict behavior in developed-country samples, though for developing-country couples the evidence is too scanty to allow conclusions.

The fifth strategy may be labeled "advanced coping." Instead of trying to extract the maximum out of a situation, one may use various means to economize on one's effort while still obtaining a satisfactory result. This includes such methods of simplifying decisions as satisficing (choosing an acceptable but not necessarily the best alternative); bounded rationality (evaluating only a subset of the possible consequences); and the development of routines and habits. Though attractive in concept, these advanced coping methods have not been illustrated with behavioral data.

The sixth strategy, which may be considered a form of advanced coping, is labeled "sequential coping," and involves adjusting one's behavior as the situation changes; one-time decisions are avoided in favor of continually modified decisions throughout the reproductive span. Sequential coping may be desirable because perceptions of demand, supply, and regulation costs change, and because fertility plans sometimes fail and require revision (Namboodiri, in companion volume).

These strategies form a rough hierarchy, from the simpler and more passive to the more complex and active. Since fertility regulation requires some effort, the strategies of denial and passivity cannot lead to regulation, whereas the other, more active strategies may.

When does a couple use one or the other strategy for a fertility decision? One important factor may be the degree to which supply exceeds demand: greater excess may require a more active strategy. The social situation is also important; it has already been suggested that traditional peasant settings may predispose toward a passive strategy. Personal characteristics also affect choice of strategy: a stronger sense of personal efficacy, a greater tendency to plan, and a future rather than a present time orientation may lead to adoption of a more active strategy. The factors determining choice among these active strategies are not known; however, it is suggested that maximizing will take place where there is more experience with the behavior and greater personal control over it and where fewer alternatives have to be considered, whereas advanced and sequential coping are more appropriate to situations with more options, more complex alternatives, less available information, and the possibility of sequential rather than simultaneous choices (Hollerbach, in companion volume).

Couple Interaction

The six strategies generally involve different degrees of cooperation between partners. A passive strategy, for instance, does not require any discussion, whereas active coping may. Although interaction

between partners has been studied more intensively in developed countries, some evidence is also available for developing countries. Considered here, first, are the effects on fertility of the partners' attitudes and their agreement with each other; second, the effects of communication between them; third, the effects of egalitarianism in the dyad; and, fourth, the effects of influence from others on the couple.

Agreement between partners need not result from discussion: in some samples, in fact, those who do not discuss the issue are more likely to think there is agreement, because they project their own attitudes onto their partners. Coincidental agreement, or concordance, is linked to passive decision making; agreement based on discussion, or consensus, is linked to more active decision making, and to a greater likelihood of fertility control (Beckman, in companion volume). The approval of both partners is often essential in decisions to control; if there is disagreement, the pronatal view is often taken by the man and the antinatal view by the woman.

Communication between spouses is essential to consensus, and suggests a more active than passive decision style. Although more frequent communication between spouses does not necessarily mean a greater likelihood of use of fertility regulation, more frequent discussion of regulation itself is consistently linked with more frequent use. Communication is often initiated by the woman. The amount of communication varies, however, by regulation method: in the case of abortion in particular the woman is somewhat more likely to make a unilateral, surreptitious decision (Beckman, in companion volume).

Communication is more likely, it might be argued, if the partners share decisions and consider each other social equals. A few studies suggest that decision sharing does lead to more frequent fertility control; other studies do not agree, however, possibly because patterns of decision sharing are difficult to determine accurately. Domestic egalitarianism in task distribution and sharing does relate to more frequent fertility control in some studies.

It has been assumed that the couple themselves make the fertility decision. It is difficult to tell how often this is not the case. Although it is sometimes alleged that mothers or mothers-in-law, grandparents or patriarchs are in fact making the fertility decisions (Caldwell, in companion volume), reliable supporting evidence has not been provided. Certainly others can influence the couple--not only relatives, but also members of peer groups and medical and paramedical personnel. Such influence may change a couple's demand or alter their regulation costs, though the ultimate decision remains their own.

FERTILITY REGULATION

Particular decision strategies, it has been argued, predispose toward the practice of fertility regulation. One of the important factors considered in a decision is the cost of regulation, especially of contraception and induced abortion (on which the focus is placed in

this discussion), but also of other means like deliberately prolonged breastfeeding, infanticide (Scrimshaw, in companion volume), and abstinence. These costs, it is important to note, should be balanced against the costs of unwanted pregnancy and childbirth incurred in the absence of regulation.

Costs of Regulation

A rough distinction is useful between the costs of access to regulation and the costs of use, with the latter including both health costs and psychosocial costs. Obtaining access to contraceptive methods involves purchase costs as well as information and travel costs. Purchase costs from private sources are similar across developing countries, and also roughly comparable for different methods, ranging from U.S.\$23 to U.S.\$34 annually for four major methods (Schearer, in companion volume). For contraceptives from public family planning programs, on the other hand, the purchase costs are usually nil. The costs of locating and traveling to a family planning facility are more difficult to determine. One study suggests that travel costs in rural areas are over a dollar a trip; moreover, for those who have no knowledge about contraception or about sources of supplies and services, information costs might be assumed to be prohibitive. Monetary costs generally do not seem to be a major barrier to contraceptive use: few survey respondents cite them as a barrier, many purchase contraceptives from private sources even when public low-cost sources are available, and price has not been a major deterrent in experimental programs (Schearer, in companion volume). Availability of information about contraception, on the other hand, and the psychosocial costs connected with obtaining access, are clearly important determinants of use.

Access to abortion depends partly on its legal status. Abortion is legal in less than 20 percent of countries worldwide (both developing and developed), and permitted with some restrictions, often fairly stringent, in another 60 percent. Legalization does not, however, require health authorities to ensure service availability, which can be complicated by many regulatory requirements, as well as by the reluctance of health personnel to provide abortions. Availability therefore varies, and the monetary costs of abortion are accordingly quite different.

Of the costs of use of fertility regulation, the most serious are probably the health risks of abortion. Mortality from illegal abortion is about 50 to 100 deaths per 100,000 operations, making it a major cause of maternal mortality in developing countries. However, where abortions are legal and easily available, the risks are dramatically lower: for instance, only around 1 death per 100,000 legal abortions was reported for Cuba during the 1970s (David, in companion volume). Similar if somewhat less dramatic differences between the morbidity effects of legal and illegal abortions are reported.

The psychic and social costs associated with abortion are often

taken to be serious. Again, however, studies in countries where abortion is legal suggest that, for the vast majority of women, feelings of guilt and depression, when noticeable, are mild and transitory, and usually followed by a sense of relief associated with successful crisis resolution. Despite such costs, and even the serious health risks of illegal abortion, substantial numbers of women resort to this method. Crude estimates of the worldwide ratio range from 200 to 450 abortions per 1,000 livebirths (David, in companion volume).

The health risks associated with particular methods of contraception similarly exert only weak influence on method selection and contraceptive prevalence. Little effort is made to publicize these risks in developing countries, given the lack of adequate medical resources and the recognition of the risks of childbirth and the benefits of controlling fertility. However, fears about health effects, often based on misinformation and rumor, do have significant impact: they are often the major reason given for discontinuing contraception.

Besides actual and feared health costs, a few other psychosocial costs might be noted. It was stated earlier that communication between partners about contraception is related to the likelihood of its use. The difficulty spouses in traditional societies have in discussing this subject may be considered a cost of many methods. Misinformation about the reliability of methods may also impose costs: often there is overestimation of the effects of traditional methods and contrary underestimation of the efficacy of more modern methods. Then there are costs of social disapproval: the couple may be concerned about violating religious or moral standards, or about gossip and ostracism within their social group, or about the attitudes of their extended families. Other probably less significant psychic costs include possible interference with sexual enjoyment and the affront to some women's modesty represented by a gynecological examination (Bogue, in companion volume).

Many of the psychic and social costs connected with contraception might be seen as generated by an innovation before it has been fully integrated into the culture. These costs are mutable, as views about the innovation change, for instance under the impact of organized public information programs. When the innovation has been fully integrated into the culture and antinatal perspectives have become entrenched in a community, it is in fact possible for these costs to reverse, and for social disapproval and other kinds of costs to become attached to uncontrolled childbearing instead of to contraception.

Diffusion and Family Planning Programs

The process of change in the acceptance of contraception might be studied as a process of diffusion. Besides affecting psychic and social costs, diffusion should also reduce the costs of access, as more information becomes available and as demand for contraceptives generates greater supply. The costs of access may be especially

affected by organized family planning programs, designed to provide contraceptives at minimal monetary cost to large populations. Health costs, on the other hand, are affected in a more complex manner by diffusion and by family planning programs: health risks are not necessarily increased or decreased; rather, imagined risks are gradually replaced by more objective assessments.

Diffusion involves the flow of information and attitudes within interpersonal networks, and, on a wider scale, within social groups and societies. It is typically a complex multistage process, involving the mass media at some point but depending critically on local opinion leaders to validate, support, and sell the innovation. At the societal level, the degree of social integration strongly influences the rate of diffusion: cultural homogeneity, geographic compactness, a strong centralized political authority, and the absence of dissenting minorities all allow contraception to diffuse more readily and its perceived psychosocial costs to drop more quickly (Retherford and Palmore, in companion volume).

Family planning programs might be considered agents of diffusion. They have a massive effect in increasing access to contraception: by the late 1970s, the number of service points in national family planning programs was about 110,000 in thirty countries. Limited growth or antigrowth policies have been adopted in three dozen countries with 80 percent of the population of the developing world; another thirty countries (with an additional 15 percent of that population) do not have such policies but nevertheless promote family planning on other grounds (Mauldin, in companion volume; Ross, in companion volume). The effects of such large-scale programs on contraceptive costs are difficult to quantify: they have certainly reduced the travel time required to obtain services for many rural populations, though many other areas remain unserved. Family planning programs have contributed to contraceptive prevalence, as several analyses suggest; although it is difficult to distinguish this contribution from the level that would exist in the absence of a program, some program effect seems fairly certain even with the imperfect models that have been tried. However, it also appears that programs have much greater effect where the social setting is initially favorable, as one would in fact expect given the analytical framework used here (Mauldin, in companion volume).

The patterns of regulation use that have resulted from the diffusion process and from family planning programs, combined with the effects of the supply-demand balance, can be reviewed only sketchily here. Contraceptive prevalence among married women of reproductive age varies considerably in the developing world, from above 20 percent in three of the largest countries--China (where rates three or four times this have been reported), Indonesia, and India--to below 10 percent in three other large ones--Nigeria, Bangladesh, and Pakistan. These latter countries, as well as several others, have had national family planning programs for years with no notable effect. In other countries, by contrast, the rapidity of change has been notable: much of the dramatic rise in prevalence has occurred within the last two decades, and often only in the last decade. This increased prevalence

has undoubtedly had significant effects on fertility, though procedures for estimating these effects do not always agree.

FERTILITY EFFECTS OF NUPTIALITY PATTERNS

Among the sociocultural factors affecting supply, demand, and regulation costs, marriage--and patterns of sexual unions more generally--has a pervasive effect. Three characteristics of sexual unions are of greatest importance for fertility: their stability; their composition, including whether they are polygynous or monogamous and whether families are extended or nuclear; and their formation and dissolution. For some of these characteristics, a strong and consistent link to fertility has been found; for others, the evidence is equivocal. Each characteristic could affect fertility through a number of channels, usually involving the supply of children but also sometimes involving demand. Moreover, each characteristic could have spurious relationships with fertility because of self-selection or because of reverse causality. Whereas something is typically known about the impact of each characteristic on fertility, little if anything is known about which of the possible channels are operative in each case.

Stability of Unions

From the standpoint of stability, three types of sexual unions may be distinguished: legal marriages; consensual unions that are socially recognized and stable but have no legal standing; and casual unions characterized by discontinuous cohabitation. Consensual and casual unions are especially important in Latin America and the Caribbean and in parts of Africa, though they are not unknown elsewhere. Type of union depends to a great extent on the couple's age: less stable forms are often transitional to more stable ones. Though women in metropolitan Latin American areas may be an exception, it is fairly consistently reported that women in more stable unions have higher fertility (Burch, in companion volume). This association may be due partly to self-selection: apart from being older, women may be selected into stable unions because of their higher fertility. It may also be due to an effect on supply: casual unions are more likely to involve extensive periods with no exposure to intercourse. Finally, it may be due to demand differences: a woman may be more likely to avoid having children until her union is stable. It has not been determined which explanation, or what combination of them, is correct.

Composition of Unions

For polygyny, the relation to fertility is more problematic (Burch, in companion volume). Polygyny involves substantial numbers in some societies: it is reported, for instance, that one in five West

African men has more than one wife. Polygynous men clearly have more children, which may in fact be a major reason for the practice. For polygynous women, however, the evidence is mixed; the predominant view in the literature is that they have lower fertility, but many empirical studies find no consistent difference. A number of possible links between polygyny and lower female fertility can be identified: for instance, the polygynous wife may have intercourse less frequently and may observe postpartum taboos more strictly, or may on the average marry later than monogamous women. It may also be argued, however, that polygyny should raise fertility by leading to early and universal marriage for women. These and other opposing arguments (Burch, in companion volume) may help to explain the indeterminate empirical findings.

The other aspect of composition is the extended versus the nuclear family. Much research on this issue fails to find a relationship between household composition and fertility. It may be argued that most of this work is flawed because it generally focuses only on current household composition, not allowing for a couple's movement through several types of households in their married life; because it considers only joint residence rather than other links between members of an extended family; and because it fails to control for other variables that may affect fertility. Recent, carefully detailed data for Taiwan do support the thesis that extended families are related to higher fertility (Freedman, 1981). The arguments for such a link primarily involve the demand for children. Compared to the nuclear family, the economics of childbearing may be more favorable in the extended family: costs may be spread more widely, and more resources may be available to make children productive. In addition, the decision process may itself be affected if the locus of fertility decisions in the extended family lies not with the couple but with their elders or if the elders exercise very powerful influence. One linkage through supply has also been suggested: the extended family may promote or facilitate early marriage. The argument may also be made, however, that the relationship is spurious, in two senses: higher fertility in a particular society may itself lead to greater family extension (though not necessarily coresidence) because couples should have more kin with whom to maintain ties and may need family extension as a means of providing childcare; or the values and outlooks in a community with many extended families may induce high fertility, whether or not the particular couple lives in an extended family situation. Although there has been recent theoretical work on these linkages, most of the issues are still unresolved (Burch, in companion volume).

Dissolution and Formation of Unions

There is less controversy on the effects of the dissolution of unions. Because attitudes toward and the incidence of divorce vary considerably across developing societies, the process of modernization induces no consistent trend in the divorce rate. The effect of

dissolution depends on the frequency and speed of remarriage: if significant time is lost between unions, fertility is affected negatively because of lower exposure to intercourse. Where venereal disease is endemic, sequential unions may also contribute to secondary sterility.

The formation of unions has been left for last here because this is a complex issue on which the research is voluminous. The timing of marriage has an undisputedly strong association with fertility. Marriage prevalence (or the proportion ever marrying) also has some effect; it is generally believed that later marriage and lower prevalence are linked, so that their effects are parallel (Smith, in companion volume).

The major effect of a delay in marriage is lower exposure to intercourse in the early, more fecund years of the reproductive span. This is only partly counteracted by a tendency toward higher age-specific fertility rates among those more recently married (Knodel, in companion volume), for several possible reasons, such as higher intercourse frequencies early in a marriage, lower previous exposure to the risk of sterility, the absence of any postpartum amenorrheic interval, and, conceivably, deliberate attempts to catch up with those who started childbearing earlier. Marriage delay may also contribute to smaller families by reducing demand for children: delay may allow each partner the time to develop roles and commitments antithetical to large families. Some suggest that marriage delay should also be seen as a regulation factor, though there is little evidence to support this in LDCs. Finally, self-selection could also be at work, if greater fecundity or less effectiveness at contraception lead to earlier marriage. As with the other nuptiality factors, the validity of these alternative explanations is uncertain (Smith, in companion volume); it is clear, nevertheless, that, throughout the world, women who marry past their early 20s generally end up with fewer children.

Trends and Determinants in Marriage Timing

Given the importance of marriage timing, a brief discussion of its trends and major determinants is in order. In the attempts that have been made to distinguish regional marriage patterns, northwestern Europe usually stands out as a region long characterized by late marriage, at least partly because of its stem-family tradition. During the demographic transition, age at marriage in this region fell with urbanization; the constraints imposed by the stem family were weaker in urban areas. By contrast, contemporary developing countries start the transition with early and usually near universal marriage; they all nevertheless show remarkably similar shifts to later marriage (e.g., Henry and Piotrow, 1979; Smith, in companion volume). These shifts, usually unaccompanied by any change in marriage prevalence, tend to occur before marital fertility begins to decline.

The factors behind these shifts are imperfectly understood, though a very diverse literature has been devoted to the determinants of

marriage timing. To summarize briefly, three very general considerations in marriage timing might be considered: the relative attractiveness of staying single; the availability of a mate; and the resources required and resource transfers involved in getting married.

The attractiveness of staying single depends on education and on employment opportunities. Given the limitations in many cultures on married women working, more education for women, particularly at higher levels, raises the opportunity costs of marrying and leaving the labor force. Education for men does not have this effect. The attractiveness of singlehood may also be affected by controls over sexual access. It has been hypothesized, for instance, that male marriage is late where social arrangements permit common-law liaisons or prostitution. The attractions of the married state, such as the social status that may be gained and the advantages of having children, must also be considered (though, as previously noted, there is little evidence about the use of marriage timing to control family size). Legislation may affect the relative attractiveness of marriage, and is more likely to be effective if it attempts this than if it simply sets some arbitrary minimum marriage age (Smith, in this volume).

The availability of a mate is determined partly by the marriage market. The effect of sex ratios on age at marriage has often been studied, generally with weak or inconsistent results. Although such ratios can be considerably perturbed by sex-selective migration, marriage markets show a flexibility that tends to override such effects.

Where marriage involves the creation of a new household, the resource requirements and transfers mandated by a marriage, including dowries and bridewealth, will be major factors in timing. Marriage may require division of land or other resources in accordance with inheritance patterns, which therefore partly control marriage timing. The implications of these and other necessary transfers are complex: households with more resources may be able to afford earlier marriages for their offspring; on the other hand, they may also generate higher aspirations among offspring that would tend to delay marriage, or they may hang on to offspring longer because their labor is more productive.

One other factor shown to affect marriage timing is urban or rural residence. Urban residence led to earlier marriage in the European transition, but is generally associated with later marriage in the developing countries today. Although some of the factors previously mentioned, like education, the efficiency of marriage markets, and the availability of resources, may be related to the effect of residence, it is not clear if they entirely account for it.

FERTILITY EFFECTS OF SOCIAL INSTITUTIONS

The nuptiality factors just discussed have a dual character: they may be considered either as personal characteristics of couples or as social institutions. In principle, other personal characteristics and social institutions could be similarly analyzed: one might identify

the relevant features of an institution, discuss the evidence relating each feature to fertility, consider the possible channels for these effects, and discuss the determinants of each feature. Although an extensive discussion of all the relevant personal characteristics and social institutions is not possible here, brief consideration can be given to the fertility effects of two of the most important personal characteristics--education and urban or rural residence--as well as to the broad effects of social institutions.

Socioeconomic Characteristics

The effect of education on fertility is often observed to be negative; this is more often true for female education, which may have an effect about three times that of male education. However, a positive effect on fertility is also sometimes observed, more often for male than for female education, more often in countries with low levels of urbanization and development, and more often, finally, at higher than at lower fertility levels (Cochrane, in companion volume). There are numerous channels through which education could affect fertility. It could influence supply by its effects on age at marriage, breastfeeding, noncontraceptive abstinence, and child survival. It could affect demand because of its linkages to the benefits and costs of children, to income and wealth, to female wage rates and labor participation, and to a number of other variables. Finally, it could affect fertility regulation by modifying access to contraception and abortion and by changing the perceived costs of using them. This variety of possible linkages creates a problem for empirical analysis: isolating the effect of education from the effects of other socioeconomic characteristics requires introducing statistical controls, but this often results in holding constant some of the channels through which education operates. Moreover, although the variety of channels allows for many possible alternative explanations for education's effects, research to document these explanations is limited.

The effects of urban vs. rural residence on fertility are somewhat smaller than the effects of education. Urban women generally have lower fertility than rural women; this difference is greater the more urbanized a country is. If marriage and marriage duration are controlled, the difference is often smaller and may even be reversed, suggesting that nuptiality is a major reason for the fertility effects of residence. As with education, there are many other possible channels related to differences in features of urban and rural communities as well as to differences between urban and rural households that affect supply, demand, and regulation costs (Cochrane, in companion volume).

Of other important socioeconomic characteristics, some, like female employment and income, have been discussed under demand because it is assumed that their major impact is through this channel. Others, like ethnicity and religion, have such different meanings

across societies that it is difficult to discuss them without considering the effects of variations in social settings.

Social Institutions

Characterizing social settings and distinguishing those that generate high fertility from those that generate low fertility is a task that researchers have barely begun to address. From descriptions of different settings and from the limited analyses available, one might identify three major institutions or complexes of institutions that appear to have the greatest significance for fertility variation (Potter, in companion volume).

First are the institutions that determine the economic contributions children can make. It is argued by some that the mode of production is critical: familial production, in contrast to industrial production, means a greater role for child labor and allows parents to reap the benefits. Other institutions are also implicated in this relationship, such as institutions that provide old age security, welfare, or insurance against risk, which by their absence may increase dependence on children; landownership, which determines the availability of a complementary factor of production; and the level of technology, which must be low to make it profitable to employ untrained children.

The second important class of institutions includes those that create tastes for or against children. Religion is primary here because it often validates pronatalist ideals, though it also has important additional effects on the normative and psychic costs of regulation. On the other side might be the consumer economy and complementary institutions like the mass media and advertising because they generate material expectations that compete with traditional family ideals; other institutions that promote secularism and the decline of traditional family values, particularly education, might also be included here.

The third major class of institutions are political institutions, which must be considered at two levels. At the community level, they may be sufficiently strong if the community is cohesive, and sufficiently motivated if the community bears the costs of providing child welfare and employment, to manipulate the incentives for childbearing, interfering fairly directly in couples' lives. At the national level, strong political institutions are essential in defining population goals and mobilizing the resources to meet them, chiefly through making fertility regulation available and reducing its costs.

Besides these three complexes of institutions, other institutions were previously mentioned for their fertility effects: public health and medical care for their effects on natural fertility and child survival; the institutions related to nuptiality and the family; and institutions and cultural patterns that create barriers to or promote the diffusion of fertility regulation.

Fertility Change

The process of modernization involves major transformations in these institutions and, complementary to these, in the socioeconomic characteristics of individuals and households.

Very few time-series studies have attempted to substantiate the effects of changing institutions on fertility. Although such studies provide limited confirmation for the impact of education, female employment, mortality change, and family planning programs on fertility, the effects of other factors have not so far been confirmed (Richards, in companion volume). There are no comparable studies that investigate the intermediate links, that is, the impact of institutional change on supply, demand, and regulation costs.

There is useful speculation, nevertheless, about the way fertility responds to the process of modernization (Easterlin, in companion volume). Setting aside many complex problems, such as the relationship between period and cohort rates as fertility changes (Ryder, in companion volume) and the nature of the modernization process itself, the process might be described in this way. In the premodern situation, marriage is early and, in most LDC settings, close to universal. Many couples desire large families, often larger than they are able to have. The early stages of modernization bring a gradual rise in marriage age, but also an increase in the supply of children, with the rise in natural fertility as breastfeeding becomes less common and with declines in infant and child mortality. At some point, supply begins to exceed fertility desires, which also begin to fall as children contribute less economically and as tastes change away from large families. Then it becomes relevant to consider fertility regulation. The costs of regulation have been declining simultaneously, not only because of family planning programs but also because of increased secularization; eventually, a threshold is reached at which these costs are sufficiently low, and the desire to limit families sufficiently strong, for substantial numbers to adopt fertility regulation. This complements the effects of marriage delay, and also accelerates the fall in regulation costs; in addition, demand continues to decline, as opportunity costs of childbearing rise late in the transition, until an eventual equilibrium is reached, with fertility at a new low level.

This speculative picture is consistent with the arguments and evidence reviewed here, though it is far from being an established view. It suggests that the current fertility situation of the developing countries is a complex of interrelated factors. From this perspective, the debate about whether development or family planning is primarily responsible for lowering fertility is largely beside the point; both are integral parts of an intricate process that no two countries pass through in exactly the same manner.

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Chapter 2

AN AGENDA FOR RESEARCH ON THE DETERMINANTS OF FERTILITY IN THE DEVELOPING COUNTRIES

The preceding chapter summarizes the research on determinants of individual fertility and fertility change in the developing countries within a unified analytical framework. Although progress in the scientific understanding of human fertility in the last two decades has been substantial, significant areas of scientific ignorance remain. This chapter attempts to sift through these areas of ignorance and identify some priority areas for further research.

Following a brief review of several recent attempts to provide such a research agenda for the field, the scope and approach of the present paper are described. Next, research priorities are discussed under the same general headings used for this volume: the supply of children, the demand for children, fertility regulation and its costs, decision-making processes, nuptiality, and the effects of social institutions and modernization.

PREVIOUS WORK

The five agendas for research on fertility determinants in the developing countries reviewed here were prepared in the last decade, and each appears to be still relevant. Most of them focus on policy-relevant research; two do not limit themselves to fertility but deal with broader population issues. They shall be considered in chronological order.

The first agenda is a short paper entitled "Social research and programs for reducing birth rates" (Freedman, 1974). The author lays out "what we need to know" and "what we know" about six topics: fertility itself, the "intermediate" variables affecting it, social norms affecting both fertility and the intermediate variables, the specific social institutions affecting fertility, mortality change and its effects on fertility, and family planning programs. He concludes that the research has major shortcomings, yet provides sufficient knowledge for family planning programs to proceed without waiting for more scientific detail. He then gives six general principles to suggest where research can best assist family planning programs. First, as a general consideration, each country requires its own data and research; not enough is known about relationships among variables

for general formulas to be reliably applied. Next, he identifies two types of data for which there is particular need: basic data on birth rates and their major components, at the national level and for major strata and local areas; and regular sample survey data on actual and potential family planning acceptors. Then he notes that family planning programs provide a special opportunity for research along the lines of natural or contrived social experiments. Finally, at the level of more basic research, he points to two areas deserving special attention: the influence of economic factors on fertility and the biosocial process of reproduction.

Also policy-oriented, though with less of a concentration on family planning, is a monograph by McGreevey and Birdsall (1974) on The Policy Relevance of Recent Social Research on Fertility. Where Freedman takes the perspective of the family planning administrator, McGreevey and Birdsall adopt the point of view of a government planner. First they review the evidence for the effects on fertility of a number of standard variables, including education, income, income distribution, employment, and infant mortality; in the process they provide a largely atheoretical catalog of verified and unverified relationships. They observe that knowledge of relationships varies in specificity: in some cases, one may have only a general idea that some relationship probably exists; in other cases, one may know exactly how much change to expect in fertility from some change in the determinant, how much it costs to produce the change in the determinant, and how cost-effective such a change is as a means of affecting fertility. Table 1 provides their useful hierarchy of the specificity of relationships. They believe that the more useful research for planners is at the more specific end, dealing with questions of elasticities, expenditures, and economizing.

In keeping with this emphasis, the research they recommend stresses the efficient use of public resources. They favor research to justify and facilitate the mobilization of external as well as local resources for population activities; research on the population impact of such government projects as rural development, expansion of educational facilities, and health, sanitation, and related public works programs; research on the allocation of resources between family planning and non-family planning programs; and research on the efficiency of family planning programs. On program efficiency, three issues are considered critical: "(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? (3) Are there means of reducing fertility that are more cost-effective than family planning programs?" In addition to these concerns with efficient resource allocation, they offer one recommendation on more basic research on fertility determinants: they argue that the household decision system should be studied more intensively, with attention to fertility choice behavior, the resource constraints on it, the options that confront the family, and the special character of decision making in societies where fertility decline is taking place.

An emphasis on high-level policy also appears in Mertens' (1978)

TABLE 1 A Hierarchy of Research Findings Addressed to Public Policy

Type	Characteristic
Observation	Awareness of relationship between fertility and some other variable without specific examination of the nature, direction, or strength of the relationship.
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.
Multiple Correlation	Findings of relationship between multiple ecological, personal and social characteristics and fertility which may suggest targeting procedure for population policy.
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.
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.
Expenditure	At this level of analysis one could predict that a stated percentage change in public sector expenditure would produce a predicted fertility reduction.
Economizing	Research demonstrating that a given balance of resources between sectors could not be replaced by any alternative, more cost-effective mix of expenditures.

Source: McGreevey and Birdsall (1974:63).

paper entitled "Research Priorities for Population and Socio-Economic Development: Recommendations for UNFPA Inter-Country Programmes," which in fact ranges beyond national to regional and global issues. Mertens attempts to lay the foundations for an agenda by criticizing certain perspectives in population work and describing what he considers proper orientations. Thus he advocates a "needs of the people" approach, proposes that the historical dimension not be forgotten in population studies, attacks the belief that desirable population changes will occur without some "blood and sweat," objects to "floating skyscrapers" (meaning theory without data), inveighs

against the "circus" of proxy variables, and cautions researchers against the sin of Faustian omnipotence and the danger of the "single research project neurosis."

Mertens' research recommendations are somewhat more down-to-earth. First, he favors national population impact studies, by which he means studies more wide-ranging than those recommended by McGreevey and Birdsall; these would include description of the demographic situation, discussion of factors influencing levels of the demographic variables, analysis of consequences of the demographic situation, and analysis of government policies in relation to population. Second, he sees the need for research on alternative government policies to influence each of the demographic variables. Under these general headings are a number of more concrete research topics, including women's roles, decision making, and intrafamily flows. Third, he recommends work on integrating population concerns into development planning. Fourth, he sees and applauds renewed interest in family planning research, and lists seven related specific priority areas: the need for programs to promote family planning; measures of family planning program effort; comparisons of family planning programs with other development and welfare programs; the provision of family planning services through indigenous institutions; the identification of new client groups; consideration of problems of unwanted pregnancy; and the contribution of family planning programs to social change. Finally, he points to a number of unexplored research areas, including ethical aspects of population issues and differential growth rates in multiethnic countries.

At least equally ambitious is Miro and Potter's (1980) report, Population Policy: Research Priorities in the Developing World, the result of a three-year review of population studies involving a substantial number of population researchers from both developing and developed countries. This report reviews both research and research capacities in the major regions of the developing world, and then attempts to describe the state of knowledge about the demographic variables, specifically mortality, fertility, internal migration, and international migration. Several appendices, published separately, provide much more detail about population studies in each region.¹ Research recommendations are made at several levels: for specific regions, on specific topics, and across all regions and topics.

Miro and Potter's general recommendations include a balanced menu of research including description, theory building, and policy-related work. Descriptive research, they argue, is needed to provide information on levels, trends, and differentials of the demographic variables; a related enterprise is decomposing demographic indices, in order to better understand what is involved in demographic change. In addition, because of the complexity of demographic phenomena, theoretical research is needed to provide suitable frameworks for analysis. They recommend that evaluation of the demographic effects of public policies and programs also receive high priority. Nor do they neglect the political dimension in population affairs: analysis of the political factors in policy making, in research generation, and in research utilization is another part of their agenda. Finally,

they argue for an integrative perspective on population and development, suggesting that "styles" of development have a dominant impact on population policy, and therefore merit special attention.

Several of these themes recur in their specific recommendations for fertility research, which include descriptive research, work on the components of fertility, and the evaluation of the impact of particular development programs. Their other priority areas are even more specific: they recommend microlevel work on the family economy, analyses of social institutions and how they affect fertility decisions, work on the availability of contraceptive services, and analyses of the effects of fertility on income distribution.

Recommendations similar to these are provided in the most recent research agenda, a statement adopted by a research awards program at the Population Council (1981) entitled "Research on the determinants of fertility: A note on priorities." After a short and highly selective review of determinants research, the paper identifies five areas that merit special attention: mathematical models for the proximate determinants of fertility; determinants of marriage patterns; the process of fertility decision making; cultural perceptions of fertility settings; the economics of having children; effects of institutional settings on fertility incentives and disincentives; access to contraceptive services and supplies, and evaluation of demonstration projects for affecting access; and the fertility implications of development programs and strategies.

In summary, the majority of these research agendas call for monitoring levels and trends in fertility and its components, though components are understood in different ways; for studying the economics of fertility and of household decision-making systems, sometimes considered together; and for conducting family planning research, the specifics being different in each case. Other topics appearing on at least two lists include access to contraception (which might be considered an aspect of family planning research), biosocial or proximate fertility determinants, and the effects of social institutions and government programs on fertility.

SCOPE AND APPROACH

The present agenda differs in scope, approach, and emphasis from each of these previous efforts. The subsections below discuss, first, what is and is not covered here; second, the level at which priorities are defined; third, the criteria used; and fourth, how this agenda might be used.

Coverage and Exclusions

This agenda focuses entirely on fertility determinants, leaving out of consideration the consequences of fertility levels and trends, mortality and migration (which one also needs to study to understand population growth), and the wider field of population and development

interrelations. Many of the issues raised by McGreevey and Birdsall, Mertens, and Miro and Potter are not addressed, not because they are unimportant but because they are beyond the scope of this paper.

The focus here is on social science research rather than biomedical research. A few of the preceding chapters do in fact refer to relevant research in reproductive biology; however, the present paper cannot adequately evaluate all the relevant biomedical work, and therefore does not consider it. This does not imply that behavioral research on fertility can safely ignore biomedical findings; in fact, closer collaboration on both sides would probably be fruitful.

Finally, this agenda does not consider research concerned with the measurement of aggregate fertility. Such research is the subject of a separate series of recent reports (Coale, Cho, and Goldman, 1980, is the first in the series); an accompanying manual (United Nations, 1982) details the best available methods for making fertility estimates with data of uncertain quality. Although there is a need to collect better fertility data in many developing countries, as well as to extract as much fertility information as possible from each data set, the focus here is on determinants rather than on such measurement issues.

Levels of Analysis

A research agenda might be developed at several different levels. The most general level might be labeled research areas, where an area covers a broad field of inquiry, such as breastfeeding and fertility. On a more specific level, priorities might be set among research questions (such as the research question: How do family planning programs affect breastfeeding?). Alternatively, priorities might be set among research approaches, used here to refer to distinct methodologies for investigating hypotheses (such as household studies or community surveys). At the most detailed level, priorities might be set among research prototypes, which can be defined by linking a specific research question to a specific research approach. For example, a research prototype might be developed along the lines of a household survey of breastfeeding practices across communities having different types of family planning inputs, with controls for other development inputs.

Ideally, priorities would be set at each of these four levels. That can be difficult, however: global comparisons among research areas can involve considerable subjectivity; at the other end, comparisons among prototypes require much more detail than can be furnished here. Therefore this paper remains at an intermediate level, attempting to identify priorities among research questions; where possible, comments about appropriate research approaches are added. The result is a more extensive agenda than any of those reviewed above. Forty important research questions are identified; these are then reviewed and placed in some order of priority.

These questions range widely, covering the need for both data and theory, the need for new measures of key variables and new methods of

analysis, the need for descriptive studies and studies that test particular hypotheses. For many of the behaviors of concern, the determinants are numerous; in these cases, models or explanatory systems, mathematical or otherwise, are recommended to address various determinants simultaneously together with their interrelationships.

Criteria for Setting Priorities

The basic criterion for selecting important research questions is the potential contribution of investigation of the topic to an increased understanding of fertility determinants. Unlike most of the agendas reviewed, which take potential impact on population policy or programs as their major criterion, the present paper adopts a scientific criterion because its objectives are different, in a sense more modest. (Nevertheless there are many points of convergence in the resulting priorities.)

How can potential gains in understanding be estimated? If there were a dominant theory or paradigm in the field, greater importance might be assigned to research that more directly confirmed or extended that theory. As the preceding chapters show, however, no current theory comes near being adequate for this purpose. On the other hand, it would be wrong to go to the other extreme and adopt purely statistical criteria, such as equating gains in understanding with explaining more of the variance in fertility. For example, one might explain a respectable portion of fertility variance with a variable like education, but if one does not know what education really means in this context and how it works on fertility, the gain in understanding may not be so great.

The present paper therefore estimates potential gains in understanding in relation to the analytical framework presented in Chapter 1. Though this framework is not a theory but a loose structure for holding together various ideas, it does encompass the field, and all the critical issues about fertility determination can be raised within it. It thus permits comprehensive and consistent discussion of the different factors affecting fertility, identification of obvious gaps, and an understanding of the extent to which different studies contribute evidence on related points. Research can be assigned importance if it (1) involves the testing of basic assumptions underlying the framework; (2) clarifies or provides measures for key concepts; (3) explicates fundamental relationships; or (4) provides data linking the framework to particular fertility situations. In addition, for a research question to have priority, methods to investigate it must be at least prospectively available.

The Use of This Agenda

This agenda is intended to provide guidance to researchers, agencies that support research, and policy and program personnel concerned with fertility in the developing countries. However, the research

priorities it provides have been chosen from a specific perspective; those using it should be aware of its limitations.

First, as noted above, several important issues are excluded from coverage, including the measurement of fertility and the consequences of particular fertility levels. Moreover, the focus is on scientific as opposed to policy criteria, though brief mention of policy implications is contained in the final section.

Second, some of the most productive research is the most difficult to anticipate. As Thomas (1979) writes about another field, "the safest and most prudent of bets to lay money on is surprise. There is a very high probability that whatever astonishes us . . . today will turn out to be usable, and useful, tomorrow." A research agenda is at best a complex projection from past research into the future, relying on guesses about developments in knowledge, and therefore may easily overlook the possibility of substantial breakthroughs that go beyond current theory.

Third, the quality of the research project is generally more important than its topic. Though this may appear obvious, especially to researchers, it has an important corollary: high-quality research on a topic that does not receive priority here may in fact be worth more, and in the long run may add more to knowledge, than research of lesser quality on a priority topic.²

Fourth, this agenda presents general priorities, without specifying which might be more important in a particular developing country or developing region of the world. These priorities involve increasing the general understanding of fertility, rather than promoting understanding of specific national or local situations.

Fifth, this agenda does not discuss the institutional and human resources available for fertility research in the developing countries (see Miro and Potter, 1980). Improving and expanding these resources is essential; otherwise, work on and from the perspectives of the developing countries might not result from this agenda. Many issues raised here are also relevant to developed countries, and work on developed-country samples or with developed-country perspectives may be more likely and may be overall of higher quality, given the availability of greater expertise, better infrastructure, and more funding support. Efforts are clearly needed to remedy this asymmetry in the distribution of scientific resources between the developed and the developing worlds.

With these limitations in mind, this agenda is presented as one contribution in what is expected to be a continuing dialogue within the research community and among research users. Unexpected theoretical developments, should they occur, may suggest reordering the emphases here, and consensual judgments about the quality of research should temper the focus on specific topics. At the least, however, this agenda should be useful as a foil against which individual researchers might develop their own priorities.

The major elements of the analytical framework described in Chapter 1 are the supply of children, the demand for children, and fertility regulation and its costs. The following sections discuss important research questions under each of these topics, and then

focus on the decision process in which couples consider these three components together. The factors affecting each component and modifying the decision process itself are then discussed within two main categories: nuptiality and social institutions.

THE SUPPLY OF CHILDREN

The supply of children refers to the number of surviving children that a couple would have in the absence of any deliberate attempt to increase or decrease fertility. Supply depends, first, on levels of natural fertility, and, second, on levels of child survival. Surviving children are specified on the assumption that number of survivors is more salient to a couple than number of births. However, the age to which children should survive to be counted in a couple's reckoning is not specified; different ages might be selected for different purposes. Survivorship is determined by levels of age-specific mortality.

It is convenient to list five components of natural fertility (Bongaarts and Menken, in companion volume), the first three affecting the length of the birth interval and the last two the length of the entire reproductive span:

- a. postpartum infecundability, which is affected mostly by breastfeeding, possibly supplemented by postpartum abstinence;
- b. the waiting time to conception, determined to some extent by frequency of intercourse and also by the fecundity of each spouse;
- c. intrauterine mortality, including spontaneous abortions and stillbirths;
- d. permanent sterility, whose incidence increases with age, and which may be preceded by terminal abstinence; and
- e. entry into the reproductive span, which is influenced partly by age at menarche and age at puberty, but more strongly by age at marriage.

These factors are not of equal importance. Age at marriage, through its impact on entry into the reproductive span, probably has as great an effect on fertility differentials as any other factor; it is accordingly treated in a special section on nuptiality below. Breastfeeding may have a comparable effect; most attention is paid to it here, and some attention is also paid to intercourse, to pathological infertility, and to terminal abstinence. The first four research questions apply to the supply factors in general; these are followed by questions about particular natural fertility components, and finally by a question on child survival.

1. How do levels and trends in the components of the supply of children vary across the developing countries? Precise data on the natural fertility components is missing for many population aggregates. Consequently, these factors are often assumed to be constant in much current research, with values assigned to them from limited sample surveys. It is desirable to obtain data from larger, nationally representative samples over time. Having measures for all the natural fertility components together, though it would probably

require supplementing social surveys with more intensive measurement efforts, would facilitate the investigation of many research issues. One issue of particular importance is the trend in supply with modernization. Some have argued that the early stages of modernization produce a sharply upward trend in supply that is crucial in producing motivation to control fertility; reliable assessments of supply levels are essential for determining the validity of this argument.

2. What measures of natural fertility and of the natural fertility components are appropriate at the level of the individual or couple? Much work on natural fertility has been concerned with comparing populations rather than understanding individual differences. Work on natural fertility therefore contrasts with work on demand or on fertility regulation, which has at least some emphasis on understanding the individual or couple. Measures appropriate to individuals or couples are essential if supply factors are to be successfully incorporated into theories of household fertility. It may be argued that natural fertility cannot be measured at the level of the individual or couple; however, a couple does form perceptions of their potential fertility, and what these perceptions are as well as what they are based on--whether the couple's own waiting times or their beliefs about group averages or about the factors affecting potential fertility--require investigation.

3. What models are appropriate--at both the aggregate and the individual levels--for the contributions of the natural fertility components to fertility levels? The reproductive models currently attracting most attention are mainly aggregate and deterministic, and have not been tested thoroughly (Bongaarts, in companion volume). Such tests are needed; in addition, new models with stochastic elements should be developed. Models at the individual level, interrelating the natural fertility components within each birth interval and across successive intervals, would make an important contribution.

4. How appropriate are the assumptions underlying the concept of natural fertility? Although natural fertility is a key concept in the framework, it is often misunderstood outside demography. Even within demography, it has two not entirely congruent definitions: it may be defined as fertility in the absence of any deliberate attempt to limit births or as fertility in the absence of any variation in fertility-relevant behavior across parities (Knodel, in companion volume). The first definition, hinging on the intent behind any practice of fertility regulation, implies the need for research to distinguish regulation meant for spacing from that meant for family limitation, and possibly from that meant to serve both purposes simultaneously, as well as on the relative prevalence of each type of behavior. The second definition assumes that any behavior varying across parities involves deliberate limitation, and that limitation always involves different practices across parities. It therefore needs to be asked how constant behavior connected with the natural fertility components is across parities. Answers to these questions should indicate how natural fertility ought to be measured, and what part of regulation behavior should be considered a supply factor.

5. What are the levels of and trends in duration of postpartum infecundability and breastfeeding in various national and subnational populations? Of the several natural fertility components, the duration of postpartum infecundability probably deserves most attention since it is apparently responsible for the greatest variation in fertility (Bongaarts and Menken, in companion volume). In addition, there is evidence that the duration of breastfeeding changes with modernization, a relationship that is important to explore. Since there is little good demographic data on postpartum infecundability and breastfeeding, the need for such data, implied in Q.1 above, is restated here. In addition, appropriate and easily applicable methods of measurement need to be developed.

6. How do variations in breastfeeding patterns and duration affect the duration of postpartum infecundability? The effect of breastfeeding duration on postpartum infecundability has been estimated, and it is known that full breastfeeding is more effective than partial breastfeeding; however, further study is needed of the effects of variations in breastfeeding practices, including the effects of different schedules and patterns of feeding (Bongaarts, in companion volume). This includes the relation between suckling and prolactin release, as well as the relation between amenorrhea and anovulation and how it is affected by breastfeeding. Such information might clarify the reasons for variations in postpartum infecundability, and thus have the practical impact of allowing women to use breastfeeding more reliably for contraceptive purposes. Quasi-experimental work with small samples, or research based on time diaries or hormonal measurement of ovulation, might provide the most useful data.

7. What behavioral models help account for variations in the practice of breastfeeding? Behavioral models are stressed here because these should provide more adequate understanding than single-variable hypotheses. Such models should explain differences in breastfeeding among social groups, as well as the effects of market forces and government programs. This question might be broken down into a series of more specific questions about the determinants of breastfeeding, on some of which there is ongoing work: (a) How consistent are variations in breastfeeding by education, income, and rural-urban residence? What explains these variations? (b) What effect do labor market opportunities for women have on breastfeeding? What other factors modify this effect? (c) What cultural beliefs, values, and practices affect the duration and pattern of breastfeeding? How can the degree of individual participation in or commitment to the relevant cultural patterns be measured? (d) Are women aware of the contraceptive effect of breastfeeding, and does this affect their use of it? How does the availability of contraceptives affect breastfeeding? (e) How do the local availability and prices of commercial infant foods and other substitutes affect breastfeeding? (f) How do beliefs about and attitudes toward breastfeeding diffuse in a population? What role do medical and hospital personnel play? Do family planning clinic personnel play any role? What is the role of education and the media

in decreasing or increasing breastfeeding, and what role do advertisements for infant foods play?

On most of these questions, the evidence to date is quite meager. A variety of research approaches might therefore be taken; these include purely theoretical model building and simulations, intensive field observation, analysis of existing survey data sets and official records, quasi-experimental work with small samples, and the design of new surveys.

8. Under what circumstances does the length of postpartum abstinence exceed the anovulatory interval? Postpartum abstinence typically has much less effect than breastfeeding. In a few populations, however, it is practiced for prolonged periods, and might have measurable demographic consequences. Studies need to concentrate on these populations, paying careful attention to changes in practices over time.

9. How does frequency of sexual intercourse affect waiting time to conception? Waiting time to conception is a second natural fertility component of some importance, and its behavioral determinants include frequency of intercourse.³ Although frequency of intercourse is typically found to decline across age groups, little if any reliable data are available from which to determine differences across populations. It is often assumed that these differences are so small that they have no important fertility effect; however, exceptions have been identified. Reports on frequency of intercourse can be difficult to obtain and may be quite undependable. This limitation, which is possibly due to the limited scientific effort in this area to date, hampers research at present. Plausible models for the relationship of frequency of intercourse to waiting time to conception are available; so far, however, they lack empirical confirmation.

A related question is: What behavioral models can account for variations in frequency of intercourse? If there are important differences in frequency of intercourse across social groups, populations, and time periods, the reasons for this require investigation. A number of more specific questions might also be posed: How does frequency of intercourse vary by type of sexual union? How does it vary by age, by age of spouse, by marriage duration? How often is it affected by physical separation (for such reasons as work outside the community) in different social settings? How does it vary in relation to cycles of work and the food supply? How is it affected by education, income, and other socioeconomic variables? How is it affected by cultural beliefs, values, and practices?

10. What factors produce high levels of secondary sterility in some settings? Both primary and secondary sterility may reach demographically significant levels in particular populations, especially in sub-Saharan Africa. Sterility is often associated with pelvic inflammatory disease resulting from sexually transmitted infections such as gonorrhoea. A number of related questions need to be investigated: (a) How prevalent is secondary sterility in different settings? (b) What are its causes? How important is pelvic

inflammatory disease resulting from sexually transmitted diseases, postabortal or postpartum sepsis, or female circumcision? (c) What is the natural history of pelvic inflammatory disease and consequent infertility? (d) What strategies are appropriate for the prevention and treatment of infertility in developing countries, and what would be the demographic consequences of control programs?

The remaining natural fertility components, though they produce less variation in natural fertility, may nevertheless be important in particular settings. Fetal loss is estimated to occur in almost two out of three conceptions, increasing sharply in frequency for women in the mid-thirties, apparently because of higher rates of chromosomal abnormalities. There is direct evidence linking venereal syphilis and indirect evidence linking malaria to spontaneous abortion rates, and this might deserve further assessment. Despite the frequency of fetal loss, it has not been shown to have any other significant demographic determinants.

The possible fertility impact of age at entry into the reproductive span is much reduced by social factors: age at marriage is usually well above age at menarche or age at puberty. At the other end of the reproductive span, the possible impact of terminal abstinence is also much reduced by biological factors, including declining fecundity and the onset of terminal sterility. For these factors, the significant research question seems to be whether and in what circumstances this practice might still have a significant fertility impact.

On the topic of child survival, the needed research is substantial and cannot be fully covered here (see Chen, in companion volume; Bell, 1980; Miro and Potter, 1980). As an example, a better understanding of the proximate determinants of infant and child mortality, including their interactions and biosocial relationships, would be useful. So would field epidemiological studies of the major infections and parasitic diseases of childhood, to delineate attack rates, prevalence, clinical spectra, and case-fatality rates. Evaluating all such possibilities for research would require a separate report. Focusing only on the interrelations between infant and child mortality and natural fertility components, one important research question might be identified:

11. How are birth interval length and infant mortality interrelated? Problems of definition and concept have somewhat clouded some previous research on this question. Very brief preceding intervals may be associated with higher mortality risk, which would in turn predispose toward shorter intervals. The mechanics of this relationship, however, are not entirely clear: shorter intervals may lead to low birth weights, limit time and resources devoted to infants, or reduce the frequency and duration of lactation. As a better and safer form of infant nourishment, breastfeeding could have a direct effect in reducing mortality; it might also have an indirect effect through increasing interval length. Maternal age and parity may also be implicated in these relationships, since shorter intervals imply that higher parities will be reached at a younger age. Even in well-nourished populations, there may still be a relationship between

birth spacing and infant mortality. Disentangling these relationships and determining the magnitude of their effects does not seem difficult in principle.

THE DEMAND FOR CHILDREN

The demand for children, as the term is used here, refers to the number of surviving children a couple wants to have. As was argued in previous chapters, couples in many settings seem to formulate such a number, and it often seems to be behaviorally meaningful. The problem of understanding exactly what demand means and measuring it properly leads to the first research question below. A couple's demand for children results from a number of considerations: their personal preferences between children and other competing goods (referred to as tastes); the benefits children provide, their cost, including the out-of-pocket costs and the time they take up, and the relative benefits and costs of competing goods (which might be said to define the "relative price" of children); and the income and wealth available to the couple to meet these costs. All of these components are included in the research questions that follow.

12. How should demand for children be measured, and what are the implications of using different measures? A number of measures of family-size desires have become fairly standard in the literature, and some of these appear to reflect demand for children (McClelland, in companion volume). It is often unclear, however, what constraints respondents have in mind in answering questions on family-size desires, and how much their responses reflect personal desires or social norms. Measures like desired family size should continue to be collected, although research on the characteristics of these measures is also needed. The stability of such measures needs to be established, as does the role played by rationalization, the effect of family growth on stated desires, and the way these relate to fertility behavior. In addition, psychometric and survey work is desirable into more sophisticated measures of demand, which should follow more closely a delineation of the theoretical criteria for such measures (see McClelland, in companion volume).

13. How does the desire for births respond to the expected level of child survival? The analytical framework assumes that demand is connected with surviving children, and that the desire for births should therefore be entirely determined by demand coupled with the perceived level of infant and child mortality. This assumption invites testing. Much less research has been devoted to this question than to the related question of the effects on fertility of prior child loss (Heer, in companion volume). Researchers have seldom attempted to measure perceived survival levels directly. A related, crucial issue is how preferred levels of childcare or preferred investments in child quality respond to perceived survival chances, and in turn affect child mortality.

14. How should tastes or relative preferences for children be assessed? There is very little useful research directly on this

question (Lee and Bulatao, in companion volume). Some researchers assume tastes to be constant and ignore them; others deal with concepts linked with but not identical to tastes, like fertility norms (Mason, in companion volume) or values and disvalues of children to parents (Fawcett, in companion volume). Although such work could provide important insights into tastes for children and should therefore continue, it should be supplemented with attempts to measure tastes directly. A key problem in producing such measures is selecting the competing goods or activities against which relative preferences for children can be assessed. Another problem is the difficulty (and perhaps the advisability) of attempting to separate tastes from perceptions of the economic costs and benefits of children.

15. What explains tastes or relative preferences for children; How do they vary across social groups, across societies, and over time? How do they develop, and how are they diffused? What models account for variations in tastes? Given the uncertainties regarding assessment of tastes, this series of questions is advanced tentatively, and will require reformulation as these uncertainties are clarified. The literature suggests that tastes for children vary in systematic ways; however, without standard measures of tastes, firm generalizations are not possible. Factors possibly related to variations in tastes that need attention include: parent's sex, education, income, rural-urban residence, family type, religion, ethnicity, and level of community or societal development. On the development of tastes, some work in population socialization is suggestive, but much remains to be done. The diffusion of tastes, particularly of weaker rather than stronger relative preferences for children (or of competing consumption aspirations), is an important related issue; more information is needed about factors that promote or retard diffusion and the manner in which it occurs.

A related topic that overlaps somewhat with other questions is the relative desire for sons and daughters. Despite recent conceptual clarification (McClelland, in companion volume), the contribution of son or daughter preferences to actual fertility variation is difficult to specify; however, this is thought to be significant in some cultures, and some work on the fertility effects might be useful.

16. What institutional factors and household characteristics affect the economic contributions of children? Child labor, the old age support children provide, and their value as risk insurance to parents all depend on institutional arrangements that may make these things important or costly or provide alternatives to them. Such economic contributions from children also vary with a family's wealth and position in the social structure. There are some careful accounts of children's economic contributions in particular settings (Lindert, in companion volume; Caldwell, in companion volume; Lee and Bulatao, in companion volume), as well as impressionistic accounts of institutional arrangements promoting such contributions (Potter, in companion volume). However, much remains to be done to specify the circumstances under which particular contributions from children are more or less important to parents: what effect landownership has on the productivity of child labor, whether social security reduces reliance

on children, how labor market structures affect the relative contributions of sons and daughters, whether local governments can manipulate incentive structures to reduce children's net value, and so forth. Measuring specific contributions and how they are perceived by couples is one research issue; a more critical one seems to be how to represent the types of institutional structures and interrelationships that enable children to contribute economically and make parents depend on such contributions.

17. How do the direct economic costs of children vary--under what circumstances do parents spend more or spend less on children?

Although this question is often studied together with the previous one, the factors determining the direct costs of children may be sufficiently distinct from those determining their economic contributions to warrant separate listing. Some inventive research has attempted to quantify parents' expenditures on children (Lindert, in companion volume); however, understanding of the factors linked to variations in expenditures is fragmentary. This clearly involves household decisions on matters like selecting levels of investment in children, as well as factors external to the household, such as the costs of childrearing inputs like education and housing. Allocative issues within the household also arise: what determines the division of goods between parents and children and their distribution among children (between sons and daughters, between first-born and later-born, etc.), and how is joint consumption to be taken into account?

18. How do couples in different social settings assess, adjust for, and react to the time costs of children? Of the alternative activities with which children interfere, women's work has received the most attention. The literature on women's work and fertility in developing countries contains many inconsistent findings (Standing, in companion volume); nevertheless, it suggests that the time costs of children are light in the developing countries or that parents find many ways of coping with these costs, such as relying on relatives or hired help, engaging in work that allows continual childcare, reducing the time they give to children, or cutting into their own leisure time. These strategies for coping are not costless, but they complicate the study of time costs and of the effects of women's work on fertility. Research is necessary on the actual magnitude of these costs, whether in lost work, leisure, or housework, and on the various strategies used to avoid or minimize them. Research should also address the effects of social settings on time costs: for instance, labor market organization, and particularly discrimination against women, may substantially affect time costs.

19. How should the economic contributions, the direct economic costs, and the time costs of children be combined into some net cost-of-children measure, and what determines the time path of this net cost in different social settings? It is useful for some purposes to reduce the economic contributions, direct costs, and time costs of children to some common metric so they can be combined and their total effect on the demand for children and on fertility assessed. One such net cost measure has been presented in the literature (Lindert, in

companion volume), and deserves further attention. Research under the preceding three questions may suggest possible changes in this measure or other approaches to measurement; research on perceptions of costs is also critical. How the net cost changes is a critical question that requires investigating changes in each of its components. In general, it is widely accepted that net costs rise in the course of socioeconomic development; whether this rise is unbroken (or whether there might in fact be a temporary fall at an early stage of development), how rapid it is, and what factors, including government interventions, accelerate or retard it all deserve investigation.

20. What are the relative effects of tastes for children, their economic contributions and direct and time costs, and household income levels on the demand for children and on fertility? This is a complex question, and some of the preceding questions dealing with measurement of demand components will have to be answered before it can be tackled. Few if any studies have dealt with the impact on demand of all of these components simultaneously. Some theorists assign primacy to particular components (e.g., to net costs; see Caldwell, in companion volume), but empirical evidence establishing this has not been provided. How the relative effects of these components vary across individuals, households, communities, and societies, as well as over time, and what causes one or another component to become more important also require investigation.

21. Can the demand for children be modified by the availability or use of fertility regulation methods--and, if so, how does this occur? The strict version of the analytical framework suggests that the demand for children is independent of fertility regulation costs. However, it is sometimes argued--and some psychosocial theories support the idea--that demand may adjust to rather than simply being a determinant of fertility control behavior. The perception that fertility can be controlled, the spreading belief that family limitation is legitimate, or the successful use of a fertility regulation method for birth spacing might lead to a downward adjustment in demand. Whether this does occur would seem difficult to establish, which may account for the lack of research on this point. If it does, however, the concept and measures of demand will require rethinking, and there are also fairly obvious practical implications. This question might equally well be listed under the next section, and provides a logical bridge to it.

FERTILITY REGULATION AND ITS COSTS

The analytical framework assumes that a couple considers the costs connected with practicing fertility regulation; if these costs are reasonable (and their motivation to control fertility, defined by the excess of supply over demand, sufficiently strong), they engage in some form of regulation behavior. Fertility regulation therefore fits into the analytical framework in two distinct ways: its costs constitute one of the three sets of factors that couples weigh in deciding whether or not to use it. This distinction is implicit in

past research on family planning: it is paralleled, for instance, by the distinction between knowledge of and attitudes toward family planning, on the one hand, and its practice, on the other. Nevertheless, the perspective on regulation provided by the framework differs somewhat from that in most previous family planning research, and leads to some research questions not commonly identified. Other questions in this section deal with standard concerns in the literature, although one common concern, the development of new contraceptive methods, is left out because biomedical research is not covered here.

22. What are the levels of and trends in the practice of fertility regulation in different countries, in different areas within countries, and in different social groups? More information probably already exists on this question than on any other question in this research agenda. Nevertheless, it remains a critical question, since fertility regulation has to be continually monitored if variations in fertility are to be understood. In addition, the data are not equally good for all countries, or for all areas within most developing countries, or for all methods of fertility regulation. Data on abortion, in particular, are usually less reliable than other data, and new approaches to measurement need to be developed. Data on prevalence of methods are better than data on method continuation, and the latter need additional work.

23. How should the costs a couple bears in obtaining access to and using fertility regulation be assessed? Researchers in this area have often been concerned with the question of who adopts fertility regulation and why. Given the analytical framework, these questions have to be asked in a new way: one should ask, both of those who practice and those who do not, what costs they bear or would they expect to bear from practicing regulation, including psychic, social, health, and economic costs. Although some inferences about these costs can be drawn from previous research (Scheerer, in companion volume; Bogue, in companion volume), the specific issue of how to measure and aggregate such costs has seldom been raised. The costs to be considered include those of obtaining access to and actually using each method. Examples would be the time and effort required to obtain a particular method, any associated embarrassment or social stigma, and the risk of side effects and the fears they engender, whether valid or not. Such costs may be expected to vary across regulation methods, and may be related to effectiveness of use. It is worth noting also that a couple may be subject to other costs if they do not use regulation, such as possible complications of pregnancy; these negative costs should also be assessed. Whether an appropriate measure can be developed to cover all these costs or whether some other approach to assessment should be taken requires study.

24. How do different ways of delivering fertility regulation services affect the costs to the couple? Fertility regulation services include not only formally established family planning programs but also private clinics, doctors, nurses, native healers, community workers, and anyone else who provides advice, supplies, or services connected with contraception or abortion. A critical measure

of the effectiveness of these services is their ability to minimize the costs among couples, both those practicing and not practicing regulation. Services have sometimes been assessed from the perspective of "user satisfaction" or their effect on fertility; both of these are less appropriate than cost minimization as output measures. Types of delivery systems may affect costs; some attention should be paid to such alternatives as community-based distribution systems, integrated community health and development programs, commercial retail sales, mothers' clubs or other acceptor groups, the simultaneous use of multiple distribution channels, saturation projects, and generally any innovative systems that appear to have greater success than parallel services in the same area. Specific features of a delivery system may also be important: which methods they provide, which they promote, and how effective these are; whether they provide a mix of methods or only a few; whether specific incentives are provided for regulation;⁴ how comfortable clients are with clinic personnel; and so on. If their impact on costs is to be determined, delivery systems have to be properly classified and their relevant features identified as well as measured, where possible.

Delivery systems for abortion also exist--the evidence is that every significant decline in birth rates has involved some recourse to abortion (David, in companion volume)--though these systems may not be officially sanctioned and may in fact be illegal. The effects of system design on abortion costs, particularly the legal status of the delivery system, may be more dramatic than in the case of contraception and also deserve study.

25. What models can account for variations in the costs to a couple of obtaining access to and using fertility regulation? Costs are affected not only by the design of fertility regulation services but also by characteristics of the individual or household (such as their location within social networks that provide information about or support for using regulation); by aspects of the social and cultural setting (such as religious prescriptions, medical folk beliefs, and public opinion); and by characteristics of particular methods (whether they require constant attention, are tied to intercourse, involve more or fewer health risks, etc.). In the absence of adequate measures of regulation costs (Q.23), research on the determinants of these costs is so far quite limited. Much detailed investigation of such factors is needed before adequate integrative models can be formulated.

26. What considerations affect a couple's use or nonuse and the effectiveness of their use of fertility regulation? The analytical framework assumes that attempts to limit family size follow from consideration of the supply of children, the demand for children, and fertility regulation costs. However, a couple may practice regulation not only to limit family size but also to space births or to avoid a birth at a particular time or in particular circumstances. Decisions to limit and to postpone births have to be distinguished, if possible, and the major considerations in each case investigated.⁵ Use and nonuse of regulation need not be considered simply as a dichotomy; there are degrees of effectiveness in the use of many methods, often

related to the underlying motivation. A common approach in this area is to attempt to identify the characteristics of users and nonusers; this allows inferences about but fails to get directly at the considerations underlying use and nonuse. Another way to investigate these questions would be to describe and analyze individual thought processes and couple decision processes.

Other aspects of the use of regulation, such as timing and choice of method, are considered under separate questions because of their importance.

27. What models can represent and account for spells of use and nonuse of fertility regulation methods? A few generalizations can be made about patterns of use of fertility regulation: for instance, the longer a contraceptive user continues with a given method, the less likely is discontinuance. More precise representations of this and similar relationships would be useful, but require better data on duration of use and spells of use and nonuse, or, essentially, detailed contraceptive histories. Even more important than representing the relationships, perhaps, is understanding the factors related to timing of initial use, to continuation and discontinuation, to method switching and readoption, and how these factors change as the couple nears, reaches, or exceeds their family-size goals. This question is linked with the previous one, since spells of use and nonuse depend partly on the intent behind use and the effectiveness of use; it is also linked with the following question, since they also depend on the particular method chosen.

28. What models can account for choice of particular fertility regulation methods? Choice of method depends on relative costs, both of access and of use. Characteristics of a method may make it more acceptable in particular cultures, more suitable for some people or at particular stages of the family cycle, more convenient or cheaper to use, and so on. Choice may be dictated by availability; it may also be affected by the information provided and the influence exercised by medical and paramedical personnel and the members of one's reference group, as well as by personal tastes. Method shifting is a related matter of some interest. The costs perceived by different people for different methods need to be specified, and models developed for the factors influencing costs and the effects of costs on method choice.

29. What models properly represent and explain the process of diffusion of fertility regulation? The spread of fertility regulation among households shows patterns similar to those for the diffusion of other innovations. Fertility regulation diffuses within interpersonal networks, flowing from opinion leaders to followers, being interrupted by barriers like geographic and social distance and differences in language and religion, and being aided or retarded by specific characteristics of regulation methods (Retherford and Palmore, in companion volume). Within and across societies, similar diffusion patterns have sometimes been suggested: diffusion may be facilitated by social and cultural homogeneity, might be more rapid in island societies, or may be impeded by ethnic and linguistic barriers. Diffusion seems to be a major factor in changing the perceived costs and increasing the adoption of regulation. The study of diffusion

patterns, whether at the micro or the macro levels, is of both theoretical and practical interest; diffusion is accomplished partly through fertility regulation services (Q.24), but also involves various psychological and interpersonal mechanisms that can modify their effect.

30. What policies and programs for fertility regulation have the most fertility impact in different social settings? Studies of family planning programs demonstrate a diversity of effects, indicating that program impact varies not only with the character of the program but also with the social setting. The effect of a fertility regulation program depends not only on its impact on regulation costs but also on other factors that interact with costs in affecting fertility. Specific fertility regulation policies and programs are unlikely to be equally effective across social settings, and it remains to be seen whether some match can be made between particular settings and the policies and programs optimal in each.

FERTILITY DECISION MAKING

A key assumption underlying the analytical framework is that a couple makes some decision about their preferred family size and tries to implement this decision. Some research on fertility decision making accepts this assumption and tries to characterize the process; other research investigates the validity of this assumption and the utility of some alternative. This work contains a variety of suggestions for "nondecisional" perspectives or alternate decision rules, but provides few solidly supported propositions (Hollerbach, in companion volume). The research questions worth further investigation must therefore be posed in rather general terms; the payoff from investigating these questions is probably less certain than for other questions in this agenda.

31. What explicit models might better account for differences in individual fertility than utility maximization models? The dominant models in the economics of fertility assume utility maximization; alternatives have sometimes been suggested, but whether they would work any better is not known. An alternative model might assume that couples do make fertility decisions but use other decision rules, that decisions are made in some settings but not others (e.g., after the demographic transition but not before it), or that individual decisions are not made at all (Hull, in companion volume). No such models have been sufficiently developed to provide testable hypotheses. For example, discussions of the influence of social norms on fertility sometimes imply a model in which individual decisions are not made; however, no one has provided a satisfactory way to identify norms or an adequate account of how they relate to sanctions and to socialization, how they affect reproductive behavior, and how these effects can be distinguished from the effects of other factors (Mason, in companion volume). The primary need, therefore, is to spell out in more detail models that are often merely implicit in sociological and anthropological writing (and some economic work) about fertility and

that might compete with individual utility maximization models. It will then be possible to determine what the new models add to understanding and how well they fare empirically.

32. What regularities are there in the process in which fertility decisions are made? The analytical framework addresses the issue of what decisions are made, not the behavioral and psychological steps and social interactions involved. Empirical investigation of this process has so far mainly used developed-country samples (Beckman, in companion volume). Several aspects of this process deserve investigation: the timing of decisions, how decisions about fertility regulation and regulation methods relate to decisions on family size, who participates in the decision process and with what influence, what search process is involved in investigating alternative choices, how information inputs affect decision making, and how marital satisfaction and other aspects of a marriage color the process. Regularities in the process are important in themselves, and may also relate to what decisions are finally made. One aspect of the process--how decisions are modified in response to changing circumstances--appears important enough to include under a separate research question.

33. How do fertility plans and decisions change in response to changing family circumstances, and what effect do such changes have on fertility? It has been demonstrated that fertility plans and decisions, and the factors underlying them, undergo transformation throughout the years of a marriage (Namboodiri, in companion volume): family-size goals may change, sterility and the probability of intrauterine mortality rise, parental resources available for childrearing may increase or decrease, the role successive children play in the family varies, knowledge of and the ability to practice regulation effectively improves. The community setting, including all the external forces acting on the decision process, may also change. Given the time required to follow a family through its developmental cycle, little research has systematically addressed the issue of the effect of such changes on fertility. Besides empirical work, theoretical modeling of the sequential decision process and its effects would be useful. It may be critical, depending on the results of such work, to reformulate the analytical framework in accordance with this rather than a single-decision perspective.

NUPTIALITY

This heading encompasses research on the timing and forms of sexual unions. Both formal and informal unions are included: though legal marriages often predominate, informal unions are demographically significant in some cultures. Both the initiation and the dissolution of unions deserve scrutiny, as do the various stages a union may pass through. Although marriage, divorce, and family forms serve many important social functions and are worth scientific study for a variety of reasons, the perspective here is limited to their fertility-relevant aspects.

34. What models can account for variations in age at marriage across societies and social groups and over time? Variations in age at marriage have been identified as a prominent reason for differences and changes in fertility levels (Smith, in companion volume). However, explaining these variations has proved difficult. There are few integrative models that take into account all the relevant factors--such as the search costs of finding a culturally acceptable mate, the sex ratio in the marrying ages, the likelihood and costs of establishing a new household, and the status rewards and economic benefits from marriage. Such models need to be developed and tested cross-culturally using multidisciplinary perspectives. Although this research question refers specifically to age at marriage, a readily identifiable point that usually represents the critical transition, it might be interpreted more broadly to refer to age at first entry into a sexual union. Another factor that needs explaining is variations and changes over time in the proportion who never marry.

35. How do the demand for children and premarital pregnancy affect timing of marriage? The assumption is often made that fertility decisions are separate from and follow marriage decisions. This simplifying assumption, which allows marriage to be omitted from discussions of fertility regulation, needs systematic investigation. Several specific points need examining: whether and how frequently timing of marriage represents an attempt to control fertility; how often, in different settings, a marriage is contracted because of a previous pregnancy; and how often changes in form of sexual union result from decisions to have children or from pregnancy. Fertility decisions may also be interdependent with decisions on subsequent marriages, as when the norm dictates having children in each of one's marriages; this too requires investigation.

36. How do form of sexual union and frequency of leaving and entering successive unions affect frequency of intercourse, and what factors modify the effects? The major forms of sexual union of concern, in contrast to monogamous legal marriage, are polygyny and consensual and visiting unions, the former of possible demographic significance in Africa and the latter two in the Caribbean and Latin America, and possibly in Tropical Africa. Whatever other effects these forms of sexual union may have, they should affect frequency of intercourse and therefore have some impact on fertility (Burch, in companion volume). However, there is little reliable data on frequency of intercourse (Q.9), and essentially none on the effect of forms of sexual union on frequency. Divorce and other forms of dissolution of sexual unions should also affect frequency of intercourse, but again the magnitude of the effect and how it varies are unknown. Obtaining reliable data about intercourse is quite difficult, and it may be worth trying simulation studies first to quantify the possible fertility effects of forms of union. A second possible effect of forms of sexual union and frequency of divorce on the supply of children is through the incidence of secondary sterility (Gray, in companion volume). There is very little evidence about this effect, but it is probably smaller than the effect of frequency of intercourse.

37. How do family structure and household composition affect the demand for children and the process of fertility decision making?

Much previous research has failed to establish any reliable link between household composition and fertility. Various attempts have been made to rescue the hypothesis that extended families produce higher fertility by broadening the focus beyond household composition to include the network of kin relationships (Burch, in companion volume). The essential research required here appears to be on the specific ways an extended family might increase the demand for children: because of the sharing of childrearing costs, because of better opportunities for utilizing child labor, because of differences in tastes for children that are somehow generated by the family structure, because decisions about children are made in a different manner or by different individuals, or for some other such reason. This question is obviously complex: it requires attention to changes in household composition through the life cycle as they affect and are affected by fertility; it may also require examination not only of family structures by themselves but also of the other social institutions and the communities in which families are embedded. It is this wider societal context that is discussed in the next section.

EFFECTS OF SOCIAL INSTITUTIONS

The farther back one moves from the most immediate or proximate determinants of fertility, the more difficult it is to determine the relative importance of different lines of research. The issue of how social institutions affect fertility is obviously critical, since major fertility change is often linked with substantial alterations in these institutions. However, the more that is learned about the immediate determinants of fertility, the more difficult it is to identify the effects of particular social institutions, since the number of channels through which they might affect fertility seems to proliferate and the possibilities for complex offsetting or pyramiding effects to increase. It also becomes increasingly difficult, as broader social patterns are addressed, to segregate a concern with fertility determinants from a concern with other demographic linkages of social institutions. Therefore, the research questions identified in this section are posed at a fairly general level, rather than dealing with specific effects of particular institutions.

38. Through what channels do a couple's socioeconomic characteristics affect their fertility? The socioeconomic characteristics of concern include, but are not limited to income, education, urban-rural residence, women's employment, ethnicity, religion, and migration and social mobility experience. For each of these factors, there is a considerable literature showing, at some times a stronger, and at other times a weaker link to fertility. Further studies of this sort seem almost inevitable. It would be of much greater scientific interest, however, to concentrate on unraveling the various possible links between each of these factors and fertility. How much of the fertility impact of a given factor is

due to its effect on breastfeeding, on tastes for children, on the balance of economic benefits and costs of children, and on perceptions of the costs of fertility regulation? Although questions like this have been asked about some of these factors, particularly education, income, and female employment (Cochrane, in companion volume; Mueller and Short, in companion volume; Standing, in companion volume), much more work remains to be done. A better understanding and more accurate representation of the intervening processes, covered in earlier sections of this paper, should generate improved research on these questions. A good portion of the work may be theoretical and integrative, involving piecing together results from a variety of existing studies and making inferences about the mechanisms involved. Some empirical testing of specific models for all the effects of particular factors will eventually be desirable, but a more immediate need is to develop alternative models.

39. What variations in institutional and community settings are consistently and reliably related to higher or lower fertility? If adequate answers were available to all of the previous research questions, it would be possible in principle to build up, piece by piece, descriptions of institutional and community settings most conducive to high and to low fertility. One could take models for the determinants of breastfeeding, of tastes for children, of fertility regulation costs, and of the decision process, extract those determinants at the institutional or community level, and combine them appropriately. It is also advisable, however, to have some research that begins at the other end, not with individual or household models, but with types of institutional and community settings, distinguishing and cataloging them and determining which are linked to differences in fertility. Little beyond impressionistic descriptions of such settings has been completed so far. It has been suggested, for instance, that fertility might be lowered by families becoming integrated into the capitalist mode of production, economic institutions that make child labor uneconomical, institutions that provide alternate forms of risk insurance, and communities that have the political will and capacity to control their populations; however, the evidence in each case is fairly limited (Potter, in companion volume). Systematically relating settings to fertility should lead to identifying the most important variations in setting, and could be followed eventually by analysis of the various channels by which each setting affects fertility.

One important aspect of institutional and community settings is the set of government policies and projects that affect fertility, including those that affect infant feeding, infant and child mortality, incentives for childbearing, female employment, the availability of contraception, and age at marriage. Study of such programs may be advantageous if they serve to manipulate variables of key interest. However, for the majority of relevant programs the obstacles to satisfactory research are considerable: the key interventions (from the perspective of fertility) are difficult to separate from others; program implementation is often at variance with program design; and program success may depend on latent receptivity

produced by extraneous factors whose effect is difficult to determine. For these reasons, evaluation of the fertility effects of development projects and policies requires considerable scientific effort and much close collaboration between researchers and project personnel.

40. What role do particular institutional changes play in the dynamics of aggregate fertility in the course of modernization?

Research on the previous question should provide some understanding of variations in fertility across institutional settings. However, understanding the dynamics of fertility in the course of modernization also requires time-series studies, to which this question refers. A better understanding is needed of the interrelationships among fertility measures in the course of modernization (see Ryder, in companion volume), as well as of the impact that particular institutional changes have on different measures (Richards, in companion volume). Adequate data for time-series studies are very limited, severely constraining the kind of work that can be done.

CONCLUSION

The agenda provided by these forty questions covers a wide range of research interests, theoretical problems, and social science disciplines. Nevertheless, the list is meant to be selective rather than comprehensive; a number of possible questions have been left out or deemphasized, such as the effect of terminal abstinence on fertility (generally slight and likely to decrease), the effect of sex preferences (listed only as a subquestion, because its magnitude is problematic), the role of infanticide (no solid evidence exists that it is frequently used for regulation), and the effects of factors like women's employment and urban residence (deemphasized in favor of studies of the channels through which these operate).

It is desirable to establish priorities among the questions listed. For this purpose, the questions are classified into several groups, priorities within groups are discussed, and the relative importance of each group considered. The questions have already been classified by topic; they are now reclassified by the general type of research indicated.

Priorities for Each Type of Research Question

On the main components of the supply of children, the demand for children, and fertility regulation costs, three types of questions can be distinguished: (a) levels and trends in some components; (b) the development of measures of other components; and (c) integrative models to represent the combined effects of components on fertility. On the determinants of these components, four additional types of questions can be distinguished: (d) models for these determinants; (e) specific relationships or linkages between variables; (f) fertility decision-making processes; and (g) global influences on

fertility. The questions are classified according to these seven types in Table 2; priorities for each type of question may now be discussed.

Levels and Trends

Three questions deal explicitly with levels and trends: in components of the supply of children (Q.1), postpartum infecundability and breastfeeding (Q.5), and the practice of fertility regulation (Q.22). It is assumed, of course, that levels and trends in fertility itself will also continue to be assessed. Questions corresponding to these on levels and trends in the demand for children and in nuptiality were not included among the forty questions. In the case of demand, research must proceed first on the development of satisfactory measures; in the case of nuptiality, some data seem to be available, and the relatively neglected study of determinants should take precedence.

Research on these three questions is desirable in each developing country for which data are not available; priority among these questions depends partly, therefore, on the specific country or region. In general, however, it may be argued that Q.5, which deals with the most important of the supply components in Q.1, takes priority over the latter. Q.22 may seem more relevant to policy decisions than Q.5, but there is less work on Q.5, and it may deserve slightly higher priority. On the other hand, there is no reason why all three of these questions could not be addressed within the same study or set of studies, as is the case to some extent in the World Fertility Survey.

Development of Measures

The five questions that address the development of new measures are listed in Table 2. Q.4 is not strictly about measurement, but it does involve the assumptions behind the key concept of natural fertility and may imply possible changes in measures.

An important criterion in comparing these five questions is the potential gain from better measures. Since measures of demand (Q.12) are currently the closest to being adequate, the gain from improving these is probably less than the gain from improved measures of tastes (Q.14) or regulation costs (Q.23), to which higher priority is therefore assigned. Measuring the natural fertility components at the individual level (Q.2) is considerably more problematic, and for this reason does not receive high priority.

Integrative Models of Components

The next set of questions addresses the proper way to combine sets of components, of natural fertility (Q.3), of the demand for children

TABLE 2 Research Questions Classified by Type and Priority

Type	High Priority	Medium Priority
Levels and trends	Postpartum infecundability and breastfeeding (Q.5) Practice of fertility regulation (Q.22)	Components of the supply of children (Q.1)
Development of measures	Tastes for children (Q.14) Costs of regulation (Q.23)	Natural fertility components (Q.2) Assumptions of natural fertility (Q.4) Demand for children (Q.12)
Integrative models	Natural fertility components (Q.3) Demand for children (Q.20)	Net cost of children (Q.19)
Models for determinants	Breastfeeding (Q.7) Tastes for children (Q.15) Economic contributions of children (Q.16) Costs of regulation (Q.25) Use and effectiveness of regulation (Q.26) Diffusion of regulation (Q.29) Age at marriage (Q.34)	Secondary sterility (Q.10) Direct costs of children (Q.17) Time costs of children (Q.18) Spells of use (Q.27) Choice of regulation methods (Q.28)
Specific relationships	Availability or use of regulation and demand (Q.21) Delivery systems and regulation costs (Q.24)	Breastfeeding and postpartum infecundability (Q.6) Postpartum abstinence and anovulatory interval (Q.8) Frequency of intercourse and waiting time (Q.9) Interval length and infant mortality (Q.11) Desire for births and expected survival (Q.13) Demand or pregnancy and timing of marriage (Q.35) Form of union or dissolution and frequency of intercourse (Q.36) Family structure and demand or decision process (Q.37)
Decision processes	Changes in plans and decisions (Q.33)	Nonmaximizing models (Q.31) Regularities in process (Q.32)
Global influences	Regulation policies and fertility (Q.30) Channels for effects of socio-economic characteristics (Q.38) Institutional variation and fertility (Q.39) Institutional change and fertility (Q.40)	

(Q.20), and of their net cost (Q.19). No parallel question was listed for the supply components as a whole because these include the natural fertility components, which are already listed, and child survival, whose addition does not pose major problems. Nor is there a parallel question for fertility regulation costs: a distinction has been made between costs of access and costs of use as well as among psychic, social, health, and economic costs, but not enough work has been done on these classifications for the manner of combining costs to be a specific concern.

Of the three questions listed, the net cost of children is probably less urgent to study, given the presence in the literature of one well-considered measure; the other two questions seem about equally important.

Models for Determinants of Components

Where the previous questions deal with combining components, these twelve questions deal with the influences upon particular components and how influences should be combined. (The questions on diffusion and on age at marriage do not strictly involve basic components, but are sufficiently similar to be included here.) Numerous possible questions are left out of this list, such as determinants of the frequency of intercourse, of the costs of alternatives to children, and of types of sexual unions.

Most of the questions listed explicitly mention the need for models, in recognition of the multiplicity of influences on each immediate determinant and the importance of interactions among these influences. However, this does not imply that only model-building research is appropriate; in most cases, much work is also needed to identify and describe influences, to confirm them, and to estimate effects before these influences can be combined in a satisfactory model.

Priorities among these questions are most easily discussed within subsets. Of the two questions on supply, the question on breastfeeding (Q.7) is clearly more important than that on secondary sterility (Q.10), since breastfeeding has a greater effect in the aggregate. Of the four questions on demand, those on tastes (Q.15) and on economic contributions of children (Q.16) have priority over those on direct economic costs (Q.17) and on time costs (Q.18), since variation in the former factors is more significant in developing countries. Of the four questions on regulation, those on regulation costs (Q.25) and on use and effectiveness (Q.26) are more basic than those on spells of use (Q.27) and on method choice (Q.28). The last two questions on diffusion (Q.29) and on age at marriage (Q.34) both seem of very high priority, diffusion because of the wide impact of the process and the potential that a scientific understanding holds for exercising control over it, and age at marriage because of the considerable fertility variation that can be traced to this single factor. Thus seven questions out of these twelve have priority; further narrowing the list is difficult and will not be attempted.

Specific Relationships or Linkages

The next set of ten questions addresses particular relationships or linkages between variables rather than sets of determinants. These questions are diverse. Three (Q.11, 13, and 35) deal with linkages that are critical in the analytical framework, though substantively the effects involved may not be large. Three others (Q.8, 9, and 36) involve secondary components that might have significant effect, though the evidence is poor. The remaining four questions probably deserve higher priority; of these, the questions on the effect of the availability and use of regulation on demand (Q.21) and on the effects of delivery systems on regulation costs (Q.24) appear slightly more important than those on the effects of breastfeeding on postpartum infecundability (Q.6) and on the effects of family structure on demand and decision making (Q.37).

Decision Processes

The three research questions on fertility decision processes are distinctive and do not fit in any of the other groups. The question on nonmaximizing models (Q.31) is the most speculative and not likely to produce immediate concrete results; the question on regularities in the decision process (Q.32) could lead to useful descriptive research, but not, in the short run, to much evidence relating to fertility variation; the third question, on sequential decision making (Q.33), appears to be the main priority here.

Global Influences on Fertility

Under global influences are included questions about determinants that affect fertility through a variety of different channels. All three of the questions on social institutions are included here, as is one question on fertility regulation. These questions are all composite, referring to multiple variables affecting fertility through multiple channels of influence. All four seem to deserve high priority.

Table 2, summarizing this discussion, shows more items with high priority than in the agendas reviewed earlier; however, these research questions are considerably more specific than the items in the other agendas.

Priorities Across Types of Research Questions

What type of research is given highest priority depends critically on the point of view adopted toward the analytical framework. Three points of view are possible: (a) to take the framework, or some more intricate version of it, seriously as a strong statement of the factors involved in fertility; (b) to accept the framework as useful, but only as a loose conceptual structure within which different

theoretical perspectives and problems can be held together; and (c) to reject the framework and replace it with some other perspective.

From the first point of view, that of taking the framework literally, the most important type of research is developing and testing integrative models for components of supply, demand, and regulation costs. More than research of any other type, this could lead directly to confirmation, rejection, or modification of the framework.

From the second point of view, testing the framework is less important than using it heuristically, particularly to identify and classify variables of interest. The key task is to elaborate on fertility determinants using the framework, and the priority questions are therefore those on determinants of the components, and possibly those on global influences and how they work their way through the framework.

The third point of view involves abandoning the framework; what is put in its place determines the priorities. If the perspective of a particular discipline or a particular research tradition were adopted, the priority questions would cut across types and refer instead to subject areas. From the perspective of family planning research, the questions might address regulation; from the perspective of psychology, demand and decision making; from the perspective of public health, supply and regulation; and from the perspective of macrosociology, global influences. Alternatively, a policy perspective might be adopted; highest priority might then be given to the questions on global influences, because they deal with possible policy instruments, and to some questions on fertility regulation.

The implications of these different perspectives for each type of research question can be briefly summarized. (a) The questions on levels and trends generally receive high but not top priority; such data are less crucial for theoretical development, though continual data collection is indispensable for research on many of the other questions. (b) The questions on development of measures lead to necessarily innovative forms of research, whose potential payoff is less certain. Since research on these questions is a high-risk enterprise, top priority is difficult to justify. (c) The questions on integrative models of the components get to the core of the framework, and deserve top priority if verifying the framework is considered crucial. (d) The questions on models for the determinants of the components deserve top priority if extending the framework and giving it substance are primary concerns. (e) The questions on specific relationships or linkages are a motley set; some of them get at core issues in the framework, whereas others are slightly more peripheral. More than for other groups, it is difficult to assign a priority for this group as a whole. (f) The questions on decision processes, like those on measures, involve innovative approaches; the payoff, again, is uncertain, and may well be delayed. (g) The questions on global influences on fertility, finally, deserve top priority if extending the framework is considered critical, and may also be assigned top priority from a policy perspective.

Research Approaches

It remains to ask what the priorities discussed here imply about research approaches. Many different approaches are required to investigate all of the priority questions; those useful for some questions are often inappropriate for others. This volume has not reviewed developments in data collection, data analysis, and theory construction; it therefore cannot provide recommendations about the most recent or most sophisticated approaches (see, e.g., National Research Council, 1981; Brillinger, 1982).

Three possible approaches nevertheless seem worthy of mention. First, large, general-purpose surveys, possibly with changing special modules, are an efficient mechanism for providing data on many topics simultaneously. For tracking levels and trends, for exploiting new measures as they are developed, and for testing models that involve large numbers of variables, such surveys present many advantages, and are desirable to conduct periodically in at least a few countries.

Second, and perhaps more important, are cross-national studies that focus on particular fertility determinants. Much mention has been made in the preceding chapters of two such studies, the Princeton European Fertility Project (Watkins, forthcoming) and the Value of Children Project (Fawcett, in companion volume). Some chapters have also made use of the World Fertility Survey, though many of its results are coming out too late for inclusion here. The insights provided by cross-national comparisons, when they involve not simply comparing fertility rates but unravelling determinants, have been especially important in the recent increase in understanding of fertility, generating many of the important hypotheses reviewed in the companion volume. Carefully designed cross-national studies, despite the considerable time and resources they require, need to be encouraged.

A third approach, that of randomized experiments, is often advocated as the proper means of investigating causal hypotheses about fertility. The experimental approach has much to recommend it, and greater ingenuity and inventiveness is desirable among fertility researchers in designing appropriate experimental or quasi-experimental tests. Government interventions often provide settings that can be utilized for natural experiments. Nevertheless, important areas for research seem so far impervious to this approach, and it remains more of a scientific ideal, in many cases, than a practical possibility.

NOTES

1. One of these appendices, by Berelson (1978), provides a perspective on policy and research issues slightly different from that of the main report but equally provocative.
2. It seems reasonable to ask how one identifies quality research. Unfortunately, there is no easy answer. Sophisticated methodology does not guarantee quality, nor does the ability to attract

research funds. Judgments on quality have to be made consensually within the research community in the context of the most recent research developments.

3. Timing of intercourse within the menstrual cycle should be, if anything, more important than frequency, but may be subject to too many random influences to merit study.
4. Some incentive schemes are meant to affect demand rather than regulation costs, and fall under Q.19 instead.
5. Spacing decisions may be considered to fall under supply. The interaction between spacing and limiting decisions is also critical to investigate.

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Appendix

ABSTRACTS OF PAPERS IN DETERMINANTS OF FERTILITY IN DEVELOPING COUNTRIES: A SUMMARY OF KNOWLEDGE

The papers on which this report is based are published in Report No. 15 of the Committee on Population and Demography, Determinants of Fertility in Developing Countries: A Summary of Knowledge. Abstracts of these papers follow.

INTRODUCTION

1 A Framework for the Study of Fertility Determinants

A household decision framework is developed within which the research evidence regarding fertility determinants can be summarized. The basic components of the framework are the supply of surviving children (determined by natural fertility and child survival), the demand for children (determined by tastes and constraints), and fertility regulation costs (including costs of access and costs of use), which combine in couples' decisions on fertility regulation. These basic components are affected by nuptiality and childbearing experience, socioeconomic characteristics, and social institutions and culture. Several key questions about the framework are discussed, including the separability of the basic components, whether couples actually make decisions, and if they do whether these are single or sequential.

THE SUPPLY OF CHILDREN

2 The Supply of Children: A Critical Essay John Bongaarts and Jane Menken

Two main factors in the supply of children, natural fertility and child survival, are considered. Of the proximate determinants of natural fertility, it is shown that postpartum infecundability and age at marriage produce the greatest variation, with waiting time to conception, age at last birth, and spontaneous intrauterine mortality having progressively less fertility effect. The determinants of these proximate determinants, specifically nutrition and health and socioeconomic and cultural factors, are briefly discussed. It is

demonstrated how many children families would have in natural fertility conditions, under various assumptions about child survival probabilities.

3 Natural Fertility: Age Patterns, Levels, and Trends
John Knodel

The concept of natural fertility is discussed: the age-pattern of natural fertility is described and factors affecting this pattern considered, particularly breastfeeding, postnatal abstinence, terminal abstinence, declines in pathological infertility, age differences between spouses, age at marriage, and premarital pregnancy. Hypothetical examples are used to illustrate the potential impact of these factors on the age pattern. Finally, trends in natural fertility and the way they relate to modernization are discussed. Reference is made throughout the paper to material from contemporary developing countries and from historical demography.

4 The Proximate Determinants of Natural Marital Fertility
John Bongaarts

Natural marital fertility is below the biological maximum because of several factors which operate in all societies but vary widely in impact. These are the postpartum infecundable period (largely, if not entirely, affected by breastfeeding), the waiting time to conception (a function of the length of the fertile part of the menstrual cycle and frequency of intercourse), intrauterine mortality, and permanent sterility. Variations in the duration of postpartum amenorrhea are the main cause of variations in levels of natural marital fertility among different populations. An examination of the biological and demographic evidence indicates that the duration of the fertile period in each menstrual cycle is approximately two days and leads to some estimates of the probability of conception given varying coital frequency.

5 The Impact of Health and Nutrition on Natural Fertility
Ronald Gray

The effects of health and nutrition on the proximate determinants of natural fertility (including breastfeeding and postpartum amenorrhea, fecundability, sterility, age at menarche and menopause, and intrauterine mortality) are examined. With the exception of pelvic inflammatory disease (PID), health and nutrition have not been shown to have a significant direct demographic effect on fertility among large populations in the developing world. Among agricultural populations and hunter-gatherers subject to severe malnutrition, health and nutrition may have some significant demographic effect.

6 The Impact of Sociocultural Factors on Breastfeeding and Sexual Behavior

Moni Nag

The sociocultural determinants of three main components of natural fertility are considered. Breastfeeding is examined as a function of education, urbanization, income, and female labor force participation. The availability of powdered milk and modern health services may also affect it. Both terminal and postpartum abstinence are examined, with the emphasis on postpartum abstinence, which has a much greater effect on natural fertility and varies greatly across societies. Finally, variation in frequency of coitus among sociocultural groups, by marriage type, and across age groups is considered.

7 Child Survival: Levels, Trends, and Determinants

Lincoln C. Chen

There is wide divergence in mortality levels and trends in various regions of the developing world. A framework is developed to analyze the factors responsible for these variations. Four determinants are hypothesized to affect child survivorship: parental factors, nutrition and diet, infection factors, and health care. These are in turn affected by socioeconomic and environmental factors at the family, community, and national levels. The implications of this framework for mortality control policies and health care programs are discussed.

THE DEMAND FOR CHILDREN

8 The Demand for Children: A Critical Essay

Ronald D. Lee and Rodolfo A. Bulatao

The concept of the demand for children is discussed: Is it meaningful in LDCs? Does it affect behavior? Is it properly measured by family-size desires? Then the factors involved in demand are considered: the economic costs and benefits of children, their time costs, tastes for children, and the effects of income and wealth. Evidence for the magnitude of the costs and benefits is evaluated, as well as evidence that each factor affects demand and, through it, fertility. How costs, benefits, and tastes change in the course of modernization is also discussed. The effects of childbearing experience on demand are briefly covered.

9 Family-Size Desires as Measures of Demand
Gary H. McClelland

What the "demand" for children means within a microeconomic model is explicated. Fertility demand is interpreted as a conditional decision process responding not only to objective economic conditions but also to subjective beliefs. As potential measures of demand, family-size desires are investigated for their face validity, their stability, their ability to reflect demand itself rather its determinants like preferences, norms, or economic constraints, their exclusion of natural-fertility and regulation-cost considerations, and their relation to fertility behavior. Two appendices consider gender preferences and levels and trends in family-size desires.

10 Correlates of Family-Size Desires
Thomas W. Pullum

Among the correlates of family-size desires considered, life-cycle factors are treated most prominently. It is argued that family-size desires exhibit some stability over the life cycle, but rationalization tends to shape desires to fit actual fertility experience. Attention is also paid to gender preferences and to the knowledge and use of family planning. Finally, socioeconomic characteristics of couples are considered as correlates of family-size desires; the evidence for their effect, once life-cycle factors, gender preferences, and family planning are controlled, is not strong.

11 Infant and Child Mortality and the Demand for Children
David M. Heer

Two major questions are considered: whether fertility responds to the actual experience of a child death and whether fertility responds to the perceived probability of child death. Prior loss does lead to increased fertility, particularly where the costs of birth control are low; however, under no circumstances does this increased fertility fully compensate for the loss. The evidence about the effects of perceived survival probabilities is thin; higher survival probabilities may contribute to lower fertility, but this has not been established.

12 Norms Relating to the Desire for Children
Karen Oppenheim Mason

The general nature of norms and two approaches to them, the Parsonian approach and the social construction approach, are discussed. It is shown that what evidence about norms is considered acceptable depends

greatly on one's theory of norms. The evidence about family-size norms is considered: responses to survey questions about perceived sanctions linked to alternative family sizes, about respondents' approval for alternative sizes, about how many children are too many or too few, about ideal and desired family size, as well as responses to projective questions and analyses of social network agreement are all considered. It is argued that the importance of norms depends on the role they are assigned in intervening between social conditions and fertility.

13 Perceptions of the Value of Children: Satisfactions and Costs
James T. Fawcett

Findings from cross-national studies of the value of children are discussed. Socioeconomic characteristics of couples affect positive values in consistent ways across cultures: lower-status urbanites and more rural couples emphasize children's economic and practical contributions; higher-status, more educated couples stress their psychosocial benefits. Cultural factors, sex roles, and life cycle factors also partly determine the values emphasized. Perceived economic costs of children do not vary consistently across groups, but opportunity costs do, especially the psychosocial dimensions involving loss of freedom and flexibility. Some evidence links particular values to fertility, and also suggests that a pattern of transition with modernization takes place in values and disvalues.

14 Direct Economic Costs and Benefits of Children
John C. Caldwell

It is argued that children make many contributions to their families, including defense against threat and investment for the future, that no other institution in pretransition societies can provide. These benefits flow especially to the elders, who control family labor and consumption, which is generally unequal. Fertility decline results from a reversal of this "wealth flow," caused by a change in emotional relationships within the family with consequences for economic relations among its members, and by such external changes as the provision of education, all of which tend to make children more costly.

15 The Changing Economic Costs and Benefits of Having Children
Peter H. Lindert

At all phases of development, couples are roughly aware of the economic consequences of childbearing. Fertility falls when, fairly late in development, the relative costliness of extra children rises. A relative cost measure is developed taking into account the need to

assess child costs relative to other forms of consumption and to discount expected future costs. This measure suggests that children are seldom ever a net asset. They may be time-supplying in less developed countries, eventually becoming time-intensive and even more costly as development proceeds.

16 Women's Work Activity and Fertility
Guy Standing

The hypothesis that women's employment reduces fertility has not been consistently supported in LDC studies. It is necessary to examine more closely the characteristics of types of work that make them incompatible with childcare: possibly only work away from home, or urban jobs, or employment in the modern sector, are incompatible. Characteristics of childcare also affect compatibility, including the availability of parental surrogates, the desired level of care, and the ability to adjust the time allocated to leisure. Other aspects of the women's work-fertility relationship discussed are the effects of work experience, job interruption, labor discrimination, and labor substitution.

17 Women's Roles, Opportunity Costs, and Fertility
Christine Oppong

The impact of children on a woman is traced through their impact on each of the major roles she plays in her life, as a mother, a wife, a member of a household, a worker, a kinswoman, a member of a community, and an individual. Children provide various economic, political, social, and psychic rewards, but women may have alternative sources for these available, and children also impose various opportunity costs and create role conflicts.

18 Effects of Income and Wealth on the Demand for Children
Eva Mueller and Kathleen Short

Macro-level studies and micro-level studies of the effect of income on fertility are separately reviewed. No consistent effect is found. The "pure" effect of income as a constraint on the household's ability to afford goods or children cannot be observed because of such indirect effects as the impact of income on tastes, its relation to female employment, and the way it raises the economic cost of children, each of which may operate to counter or reinforce the pure effect. Source of income may also be important: in rural areas, landownership is related to higher fertility. No good evidence for the effect of income inequality on fertility has so far been presented.

FERTILITY REGULATION AND ITS COSTS

19 Fertility Regulation and Its Costs: A Critical Essay
Albert I. Hermalin

Hypotheses concerning the relation of motivation and costs to fertility regulation are reviewed. The costs of fertility regulation to the couple are discussed, covering the costs of access (which include costs of purchasing services and information and travel costs) and the costs of use (health costs and psychosocial costs). Methods of measuring and analyzing the concepts of motivation and costs are described and illustrated. Attention is given to distinguishing the role of individual socioeconomic characteristics from the impact of development, diffusion, and family planning. In this context, the research on evaluation of family planning programs is reviewed.

20 Birth Control Methods and Their Effects on Fertility
John A. Ross

Data on the prevalence of contraceptive methods and abortion are presented. Countries vary by contraceptive prevalence levels, with some of the largest LDCs being above 30 percent but others being below 10 percent. The pill and sterilization are the leading methods overall, though the ranking varies by country. For method continuation, sterilization and the IUD outrank the pill. The use-effectiveness of the methods is considered, and links to fertility are discussed in a brief review of the relevant literature.

21 Monetary and Health Costs of Contraception
S. Bruce Schearer

The monetary costs of contraception are analyzed and new survey data used along with existing data to estimate their magnitude. It is concluded that monetary costs have a substantial indirect impact on contraceptive use: they significantly restrict availability of supplies and services in many developing countries. However, people's ability to pay for contraception may be much greater than generally believed, permitting important public sector cost reductions and more efficient design of both public and private distribution systems in the future. Health costs are also reviewed; it is concluded that these costs, although substantial, exert little impact on overall contraceptive use or fertility in developed countries. In developing countries, however, largely due to limited familiarity with contraception and lack of scientific and health knowledge in general, fears about side effects are a significant deterrent to contraceptive use. In countries where knowledge and experience become more widely diffused, however, this barrier rapidly diminishes.

22 Normative and Psychic Costs of Contraception
Donald J. Bogue

An inventory is presented of the normative and psychic costs attached to contraception, and illustrated at several points with Egyptian data. The major normative and psychic costs, it is argued, are fears of side effects and of long-term health effects (often unrelated to objective risks), anxiety over contraceptive failure, the need for discussion with the spouse, and the need for internal control over behavior. These costs, and other less important ones, can be reduced by well-planned programs of public information.

23 Abortion: Its Prevalence, Correlates, and Costs
Henry P. David

The legality of abortion and its incidence worldwide are described. No country has achieved fertility decline without some recourse to abortion. Mortality from illegal abortion is very high, making it a major cause of maternal mortality; for legal abortion under proper clinical conditions, however, rates are lower than for normal deliveries. Psychological costs are difficult to assess, but generally, where abortion is legal, do not seem to be serious.

24 Infanticide as Deliberate Fertility Regulation
Susan C. M. Scrimshaw

Deliberate infanticide and passive infanticide (infanticide through neglect) are discussed as means by which couples may attempt to control family size and composition. There is little good statistical evidence on these practices, but some indirect evidence (such as imbalanced sex ratios or mortality within a closely spaced pair of births) as well as many ethnographic accounts exist. The available evidence indicates that infanticide as deliberate fertility control existed in preindustrial times, but has increasingly been replaced by differential care in industrializing societies.

25 Population Programs and Fertility Regulation
W. Parker Mauldin

During the past two decades, a substantial number of LDCs have adopted population policies and programs designed to reduce rates of population growth. Contraceptive prevalence has risen considerably in many of these countries, and fertility rates have declined appreciably, although the changes have been quite uneven across countries. Both improvements in social and economic sectors and the implementation of family planning programs have influenced fertility declines, but it is difficult to disentangle the effects of these factors. Availability of contraceptives does seem to promote their

use, however. The consensus seems to be that family planning programs, when well-managed, do have a substantial effect independent of the influence of socioeconomic factors.

26 Diffusion Processes Affecting Fertility Regulation
Robert D. Retherford and James A. Palmore

Diffusion of birth control is a process integral to fertility transition. Diffusion proceeds more readily where there is greater cultural homogeneity and social integration, and it can advance the timing and accelerate the pace of transition. Diffusion operates through a hierarchy of networks at several levels: the local or personal, the national or family planing, and the international. Utility-cost concepts are useful in explaining the timing and rate of diffusion and provide a means of integrating difusion concepts into fertility transition models.

FERTILITY DECISION-MAKING PROCESSES

27 Fertility Decision-Making Processes: A Critical Essay
Paula E. Hollerbach

The literature, mainly social-psychological, on fertility decision-making processes is reviewed. Different types of decisions, such as passive and active, are defined, and the decision processes characterizing pretransitional and posttransitional societies distinguished. Some decision models focus on the perceived supply of children, others on the demand for children, still others on the perceived costs of fertility regulation; a few combine all these elements. Rules such as subjective expected utility and expectancy x value specify how individuals combine and weigh decision factors. Sequential models focus on different stages of the family life cycle. The manner in which competing decisions among family, kin, and others are reconciled is also examined.

28 Cultural Influences on Fertility Decision Styles
Terence H. Hull

Decisions affecting fertility are ubiquitous: they involve not only ultimate family size but also marriage, breastfeeding, intercourse, and many other culturally patterned behaviors. A complex web of cultural knowledge and symbolism surrounds these decisions, which sometimes, or for some parts of a decision sequence, may take on a routine or habitual pattern. The argument that no decisions are made is considered and rejected. Different fertility-related decisions are classified according to a variety of criteria, including whether the individual is usually aware that choices are available, whether either

habit or custom make the decision routine, whether joint decisions are necessary or likely, and whether decisions are morally sensitive.

29 Communication, Power, and the Influence of Social Networks in Couple Decisions on Fertility

Linda J. Beckman

Couple agreement and couple interaction are examined as they affect fertility decisions. Agreement more often reflects projection in the absence of discussion, and is therefore more often linked to high fertility. Couple discussion promotes lower fertility, partly because discussion is necessary for some forms of contraception.

Egalitarianism may also promote lower fertility, possibly because it encourages communication, but the evidence is unclear. The influence of others--members of the extended family, peer groups, medical and paramedical personnel--on couple decisions is also discussed.

30 Sequential Fertility Decision Making and the Life Course

N. Krishnan Namboodiri

Fertility decisions are discussed as a sequential process interacting with the couple's passage through the stages of the life course. Motives for having children change; fertility plans require reformulation after failures due to fecundity impairment, marital breakdown, or unintended pregnancies; and the social position, household arrangements, employment plans, and marital relationships of the couple are altered by unforeseen events. The effect on reproduction depends on the timing of each event.

NUPTIALITY AND FERTILITY

31 The Impact of Age at Marriage and Proportions Marrying on Fertility

Peter C. Smith

Areal variation in marriage patterns across and within nations is reviewed, and trends are compared for the historical European transition and contemporary LDCs. The effects of marriage pattern on fertility depend on reduced exposure to intercourse, but also involve the shifting of childbearing to older ages and such aggregate effects as changes in the mean length of a generation. Determinants of marriage timing are covered in a very diverse literature, which includes work on the availability of spouses, changes in family institutions from agricultural to industrial settings, and the effects of urban residence, education, and different types of employment.

32 The Impact of Forms of Families and Sexual Unions and Dissolution of Unions on Fertility

Thomas K. Burch

Several characteristics of marriages (sexual unions) or kin groups are investigated for their effects on fertility. First, polygyny has a positive impact on male fertility but an indeterminate impact on female fertility; several possible reasons for this are discussed. Second, stability of unions tends to increase fertility; consensual and visiting unions may involve restrictions on exposure to intercourse and may also involve lower demand for children. Third, marital dissolution tends to reduce fertility if remarriage is infrequent or delayed. Fourth, the extended family may promote higher fertility; the evidence on this is mostly inconclusive, but more recent work has begun to deal with many of the methodological problems. The prevalence and determinants of these different patterns are also discussed.

SOCIAL INSTITUTIONS AND FERTILITY CHANGE

33 Modernization and Fertility: A Critical Essay

Richard A. Easterlin

The components of the analytical framework are considered as intervening links between modernization and the fertility transition. Various aspects of modernization, including improved public health and medical care, urbanization, new goods, and growth in formal education, affect supply, demand, and regulation costs. These, in turn, are linked to the adoption of fertility control. It is demonstrated that this approach could help explain differences in the timing of fertility decline and changes in fertility differentials by age and other social characteristics. Changes in demand and regulation costs are recognized as important in the transition, but changes in supply are also critical, as couples move from an era of social control over fertility to an era in which individual control is needed.

34 Effects of Education and Urbanization on Fertility

Susan H. Cochrane

The various channels through which education and residence affect fertility, through modifying supply, demand or regulation costs, are outlined. Determining the fertility effects of education and residence is difficult because introducing statistical controls often results in limiting the channels considered. Education often has a negative effect; circumstances under which a positive effect is more likely are identified. Urban residence usually leads to lower fertility, more often at higher levels of urbanization.

35 Effects of Societal and Community Institutions on Fertility

Joseph E. Potter

Social institutions affect fertility in several ways. The presence or absence of welfare institutions, the nature of landholding arrangements, and the availability of education and health, among other institutional factors, change the economic contributions children are expected to make and their costs to parents. The consumer economy, religion, and the image of the family affect the values placed on marriage and children. The strength of local and national governments determine whether fertility policies will be adopted and how effectively they will be pursued. Data from various countries are used to illustrate the impact of institutions.

36 Effects of Culture on Fertility: Anthropological Contributions

Robert A. LeVine and Susan C. M. Scrimshaw

A guide is provided to the anthropological literature on human fertility, with specific attention to the concepts of culture and natural fertility and to the processes by which fertility patterns are linked to human adaptation at the societal and family levels. Anthropological research methods are discussed as complementary to demographic approaches in the understanding of factors affecting fertility in developing countries. The review includes historical and contemporary perspectives and also covers the cultural acceptability of intervention programs.

37 Statistical Studies of Aggregate Fertility Change: Time Series of Cross-Sections

Toni Richards

A small set of statistical studies have investigated the determinants of fertility change, either within countries or across countries. These studies are reviewed, with careful attention to their methodological aspects. Cross-sectional results are distinguished from time-series results; these are often quite different. The effects of standard sociostructural and economic variables--industrialization, income growth, urbanization, infant mortality, family planning programs--are summarized for the few studies available.

38 Cohort and Period Measures of Changing Fertility

Norman B. Ryder

The mathematical relationship between cohort and period fertility is explicated. These two measures generally diverge as fertility changes; economic conditions may displace births from one period to another but not affect cohort rates, or the mean age of childbearing

may change over the long term, again with greater impact on period than cohort rates. Understanding these relationships is essential if apparent changes in fertility are to be properly interpreted.

Reports of the Committee on Population and Demography

- Report No. 1 *Estimation of Recent Trends in Fertility and Mortality in the Republic of Korea* (1980)
- Report No. 2 *Fertility and Mortality Changes in Thailand, 1950-1975* (1980)
- Report No. 3 *Fertility and Mortality Changes in Honduras, 1950-1974* (1980)
- Report No. 4 *Age Misreporting and Age-Selective Underenumeration: Sources, Patterns, and Consequences for Demographic Analysis* (1981)
- Report No. 5 *Estimation of Recent Trends in Fertility and Mortality in Bangladesh* (1981)
- Report No. 6 *Collecting Data for the Estimation of Fertility and Mortality* (1981)
- Report No. 7 *Data Collection: A Statement for Administrators* (1981)
- Report No. 8 *Trends in Fertility and Mortality in Turkey, 1935-1975* (1982)
- Report No. 9 *The Estimation of Recent Trends in Fertility and Mortality in Egypt* (1982)
- Report No. 10 *Indirect Techniques for Demographic Estimation* (1981)*
- Report No. 11 *Computer Programs for Demographic Estimation: A User's Guide* (1981)
- Report No. 12 *Levels and Recent Trends in Fertility and Mortality in Colombia* (1982)
- Report No. 13 *Fertility in Thailand: Trends, Differentials, and Proximate Determinants* (1982)
- Report No. 14 *The Determinants of Fertility in the Republic of Korea* (1982)
- Report No. 15 *Determinants of Fertility in Developing Countries: A Summary of Knowledge*** (1982)
- Report No. 16 *Determinants of Fertility in Developing Countries: An Overview and Research Agenda*** (1982)

Other Publications of the Committee on Population and Demography

Research on the Population of China: Proceedings of a Workshop (1981)

*Being published as Manual X in the series of manuals of demographic analysis of the Population Division, Department of International Economic and Social Affairs. United Nations (1982).

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