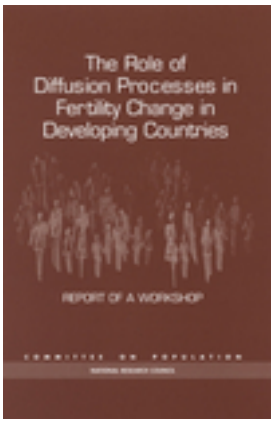

The Role of Diffusion Processes in Fertility Change in Developing Countries

Committee on Population, National Research Council
ISBN: 0-309-51888-1, 42 pages, 6 x 9, (1999)

The Role of Diffusion Processes in Fertility Change in Developing Countries

REPORT OF A WORKSHOP

Holly Reed, Rona Briere, and John Casterline, editors

Committee on Population
Commission on Behavioral and Social Sciences and Education
National Research Council

NATIONAL ACADEMY PRESS
Washington, D.C. 1999

NATIONAL ACADEMY PRESS • 2101 Constitution Ave., NW • Washington, DC 20418

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This project was funded by the William and Flora Hewlett Foundation, the Andrew W. Mellon Foundation, and the U.S. Agency for International Development. Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the organizations that provided support for the project.

International Standard Book Number 0-309-06478-3

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Printed in the United States of America

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Preface

This report summarizes presentations and discussions at the Workshop on the Social Processes Underlying Fertility Change in Developing Countries, organized by the Committee on Population of the National Research Council (NRC) in Washington, D.C., January 29-30, 1998. The workshop was funded by the William and Flora Hewlett Foundation, the Andrew W. Mellon Foundation, and the U.S. Agency for International Development.

Fourteen papers were presented at the workshop; they represented both theoretical and empirical perspectives and shed new light on the role that diffusion processes may play in fertility transition. These papers served as the basis for the discussion that is summarized in this report. In addition to this summary, the papers themselves were bound in draft form and distributed to a limited audience in 1998. A selection of the papers will be edited and published as a separate volume.

The committee is grateful to past and present members John Bongaarts, John Casterline, Mark Montgomery, and Alberto Palloni, who served on a subcommittee (chaired by John Casterline) that assumed responsibility for organizing this workshop. In addition, the committee thanks Steven Sinding, who attended one of the planning meetings and provided valuable advice as well as participating in the workshop.

The staff at the National Research Council managed the workshop from start to finish and made it all possible. Barney Cohen, director of the committee, helped develop the framework for the workshop, coordinated the contributions of participants, and gave valuable comments on various drafts of this report. LaTanya Johnson, senior project assistant, organized logistical and travel arrangements. Rona Briere, consultant to the committee, produced the first draft of this

report. Holly Reed, research associate, edited several subsequent drafts and worked with John Casterline to produce the final report. Finally, Eugenia Grohman, associate director for reports for the Commission on Behavioral and Social Sciences and Education, skillfully edited the manuscript and guided it through the review process.

We are also grateful to the following workshop participants and sponsors, who read the draft manuscript and shared valuable suggestions and comments that were incorporated into the final report: Caroline Bledsoe, Northwestern University; John Cleland, London School of Hygiene and Tropical Medicine; David Kertzer, Brown University; Ron Lesthaeghe, Vrije Universiteit, Brussels; Carolyn Makinson, The Andrew W. Mellon Foundation; Karen Oppenheim Mason, East-West Center; Mark Montgomery, The Population Council and State University of New York, Stony Brook; Everett M. Rogers, University of New Mexico, Albuquerque; Steven Sinding, The Rockefeller Foundation; and Thomas Valente, Johns Hopkins University.

This report has been reviewed in draft form by individuals chosen for their diverse perspectives and technical expertise, in accordance with procedures approved by the NRC's Report Review Committee. The purpose of this independent review is to provide candid and critical comments that will assist the institution in making the published report as sound as possible and to ensure that the report meets institutional standards for objectivity, evidence, and responsiveness to the study charge. The review comments and draft manuscript remain confidential to protect the integrity of the deliberative process.

We thank the following individuals for their participation in the review of this report: Ronald Freedman, Institute for Social Research, University of Michigan (emeritus); Joshua R. Goldstein, Office of Population Research, Princeton University; Charles Hirschman, Department of Sociology, University of Washington; Geoffrey McNicoll, The Population Council, New York, New York; S. Philip Morgan, Sociology Department, Duke University; Ronald Rindfuss, Carolina Population Center, University of North Carolina; and Gary Sandefur, Institute for Research on Poverty, University of Wisconsin. Although the individuals listed above have provided constructive comments and suggestions, it must be emphasized that responsibility for the final content of this report rests entirely with the authoring committee and the institution.

Most of all, of course, we are grateful to the dedicated participants in the workshop, whose ideas and comments are summarized here. We hope that this publication helps ensure that their work will continue to contribute to research on the processes underlying fertility change and to policy in the field of reproductive health and family planning.

Jane Menken, *Chair*
Committee on Population

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The Role of Diffusion Processes in Fertility Change in Developing Countries

INTRODUCTION

In a majority of developing countries, fertility rates have declined markedly during the past 40 years. Earlier, fertility declines were rare, and in many countries fertility rates actually rose between 1945 and 1960. Yet since 1960, fertility rates have fallen in almost every part of the world and in countries with different political, economic, and social systems and disparate cultural, ethnic, and religious backgrounds. Most regions of the world now have relatively low total fertility rates (TFRs).[1] In Latin America and the Caribbean, for example, the TFR was 5.2 children per woman in 1970, but had declined to 2.8 by 1991. Similarly, in Southeast Asia, the TFR declined from 6.0 children per woman in 1970 to 3.5 in the mid-1990s. Only parts of sub-Saharan Africa and South Asia have registered little or no decline in fertility rates.

Theories to Explain Fertility Changes

Demographers have struggled to explain differences among countries in the timing and speed of such fertility changes as well as how prior mortality declines, socioeconomic changes, organized family planning programs, and the diffusion of various norms and ideals related to childbearing contribute to these differ-

[1]The total fertility rate (TFR) is a period measure that represents the number of births a woman would have if she experienced age-specific birth rates throughout her reproductive years. It is the sum of these age-specific birth rates as observed in a given year (Shryock and Siegel, 1971).

ences. The "theory of demographic transition" has become the overriding paradigm to explain how fertility changes. Demographic transition describes the societal shift from high fertility and high mortality (pre-transition) to low fertility and low mortality (post-transition). According to the classic demographic literature, demographic transition is caused by socioeconomic development and modernization. In addition, a decline in mortality precedes the drop in fertility (Notestein, 1945, 1953). The empirical record, however, appears to refute the simplest statements of demographic transition theory. For example, changes in reproductive behavior often have only been loosely correlated with economic, social, or cultural change, which tend to occur at different paces (Cleland, 1985). In Thailand, for example, Knodel and colleagues (1987) document how change in reproductive behavior and attitudes permeated almost every segment of Thai society within a period of approximately 15 years. The Committee on Population documents how changes in fertility and contraceptive use in Kenya cut across social, economic, ethnic, and geographic boundaries (Brass and Jolly, 1993).

The inability of demographic transition theory to accurately predict the timing or pace of actual fertility transitions has generated debate about the relative importance of a set of factors that contribute to fertility decline within particular structural or cultural contexts. Fertility declines are undoubtedly linked to social, economic, political, and cultural changes, but the nature and specific combination of each of these factors varies from one society to another.

The growing frustration within the field at the lack of predictive power of demographic transition theory has been the catalyst for researchers to reexamine the contribution of diffusion theory to the determination of the timing and pace of fertility transition. The essential idea behind diffusion theory is that social interaction is a key mechanism through which the adoption of new technologies, ideas, and behaviors takes place. However, there are many different views on how diffusion should be defined, as explained in this report.

In the late 1970s and early 1980s, diffusion theory attracted the interest of several demographers as evidence mounted that theories relying on individual rational decision making in response to economic or structural change could not fully explain the observed fertility transitions in many areas of the world. While both mortality declines and structural and economic changes remain important elements of explanations for fertility declines, the results of two major research efforts completed in the mid-1980s—the Princeton European Fertility Project and the World Fertility Survey—caused certain researchers to conclude that structural and economic changes alone provide an incomplete explanation (see Bongaarts and Watkins, 1996; Cleland and Wilson, 1987; Coale and Watkins, 1986).

Some researchers viewed the findings of the Princeton European Fertility Project as providing major support for diffusion theory explanations of fertility change (Knodel and van de Walle, 1979). This project analyzed aggregate historical demographic data from the time of the fertility transition in Europe (ap-

proximately 1880 to 1930) for many of the provinces in that region (Coale and Watkins, 1986). Lesthaeghe's (1977) volume on Belgium is one of the studies that illustrated the limitations of strictly economic theories of the timing and pace of fertility change. Several interpretations of the European evidence concluded that diffusion processes were major determinants of the observed patterns of change. Knodel and van de Walle (1979) were among the first to endorse diffusion theories in their interpretive review of findings from fertility research in the 1960s and 1970s. Support for the diffusion theory was again articulated by Watkins (1986) and later augmented with theory about the micro-level social mechanisms that generate aggregate-level patterns of fertility change (Watkins, 1990).

The World Fertility Survey (WFS) was based on cross-sectional surveys of women in developing countries, and it found similar patterns for regions outside Europe. Diffusion theories gained new credibility and were perceived as challenging purely economic theories of fertility change (Cleland and Wilson, 1987). Cleland (1985:247), for example, noted: "The fact that parental education and cultural factors, denoted by language, ethnicity, or region, emerge as major independent determinants of the onset of decline is more consistent with ideational than structural theories."

Findings from these two major research projects prompted attempts to articulate how diffusion processes affect the timing and pace of fertility change. In an influential and controversial piece, Cleland and Wilson (1987) argued that diffusion processes are key to understanding both historical and contemporary fertility transitions. More recently, Kirk (1996) and Van de Kaa (1996) reviewed theory and research on fertility over the past five decades and attempted to place diffusion arguments in this larger context. Finally, Mason (1997) also specified "social interaction and influence" as a key mediating factor in a larger framework for fertility transition.

In addition, several researchers have recently published empirical evidence that diffusion dynamics have affected fertility change in developing countries. Bongaarts and Watkins (1996) combined analysis of national-level data with qualitative material from Kenya. Entwisle et al. (1996) blended survey and qualitative interview data in a study of contraceptive method choice that revealed powerful diffusion effects. In an aggregate-level analysis, Montgomery and Casterline (1993) examined the diffusionist patterns of fertility change in Taiwan in the 1960s and 1970s. Finally, Rogers and Kincaid (1981) and later, Montgomery and Chung (1998) used micro-level data from Korea to investigate how social networks affect contraceptive decisions. These studies vary in their theory, methods, and data, but each one focuses on social interaction processes and their impact on the timing and pace of fertility change.

Along with the recent empirical research on diffusion effects on fertility, there has been an effort to develop behavioral models that incorporate these effects. One important concept in this area is the idea of "social learning" or ac-

quiring information through social networks, as presented in work by Montgomery and Casterline (1996) and Kohler (1997). In addition, Rosero-Bixby and Casterline (1993) proposed that social interaction processes can be specified as feedback effects within the conventional fertility determinant frameworks of the 1970s and 1980s. Pollack and Watkins (1993) also tackled the problem of fitting social interaction effects into conventional fertility theory. Some of this recent work appears to draw on social network and communication theory developed in the 1960s and 1970s, which has been reviewed by Rogers and Kincaid (1981) and Beckman (1983).

The Workshop

There is a growing body of researchers who are interested in the contribution that diffusion theory might make to the explanation of fertility transition in developing countries. Yet the magnitude and nature of diffusion effects are still unclear. Motivated by these unresolved issues, the National Research Council convened the Workshop on Social Processes Underlying Fertility Change in Developing Countries on January 29-30, 1998, at the National Academy of Sciences in Washington, D.C.

This workshop was intended to serve as an arena for leading researchers who are working on diffusion processes and fertility change to discuss their recent theories and findings and to consider the implications that these findings may have for future research and policy endeavors. This subject is often a contentious one, and there is no single common language or body of theory that guides the debate. Therefore, the idea behind the workshop was not to reach a consensus regarding how diffusion affects fertility change, but rather to ask the leading researchers who have been working in this area to come together and provide their assessment of what is now known about the possible role of diffusion in the fertility transition.

Workshop participants represented a number of different disciplines, including demography, sociology, economics, anthropology, decision sciences, communication, public health, and population policy. The goal was to bring together these representatives of various disciplines to review current knowledge and theory about certain aspects of diffusion. Participants were asked to examine what is now known about the relationship between the diffusion of ideas and the fertility transition, to identify some of the major obstacles to increasing understanding of diffusion processes and fertility change, and to suggest how the obstacles might be overcome. Fourteen papers were presented at the workshop. These papers and the discussion at the workshop are summarized in this report.[2]

[2]The papers were bound in draft form and distributed to a limited audience in 1998. A selection of the papers will be edited and published as a separate volume.

The workshop organizers posed five specific questions to the participants:

1. How can diffusion be defined in the population and family planning context?
2. Can diffusion effects be measured, and if so, how?
3. What are the channels through which diffusion operates and how important is each channel?
4. What do diffusion effects contribute to the explanation of fertility transitions beyond the effects of structural change?
5. What are the public policy implications of diffusion research?

The goal of the workshop was not to achieve consensus on these questions but to delineate the issues involved, summarize what is known, highlight areas of agreement, identify key areas of disagreement that require further study, and, insofar as possible, characterize the policy and program options.

The discussion is summarized in five sections below, corresponding to these five main questions; however, this division is to some extent artificial, because the topics are so closely related. For example, it is difficult to disentangle the question of the relative role of diffusion and structural change and the question of what exactly is being diffused (e.g., information about family planning or information about the economic benefits of smaller families). Much overlap therefore occurs throughout the text that follows, as it did at the workshop.

DIFFUSION IN THE POPULATION AND FAMILY PLANNING CONTEXT

In the family planning context the diffusion of new technologies, ideas, and behaviors has to do with both knowledge, attitudes, and practice of contraception and ideas about the benefits versus the costs of childbearing (Cleland, 1985). Workshop participants were in general agreement that the concept of diffusion needs to encompass both products or technologies and procedures or ideas, as well as knowledge of these things and the norms and values associated with behavioral change.

Pure Versus Blended Theories of Diffusion

A central theme throughout the workshop was how to identify the relative roles of diffusion and structural change in fertility transition. Alberto Palloni explained the difference between structural and diffusion explanations of behavioral change as follows (1998:4):

> "Structural" explanations of behavioral changes seek their cause in the alteration of preferences and opportunities that result from either changes in positions that individuals occupy (individual social mobility) or from reshuffling of resources

> associated with a given social position (structural social mobility or redistribution of wealth). Diffusion explanations or models, on the other hand, attempt to identify a cascading mechanism that leads to cumulative adoption of behaviors by some individuals, even while their social position or the resources associated with them change only trivially or remain unaltered. In diffusion models, the behavior "spreads" and is adopted by individuals irrespective of their socioeconomic positions, even among those whose social or economic positions are *hypothetically* associated with cost-benefit calculations that do not necessarily require the new behavior. Adopting the new behavior occurs as a result of reevaluation of one's own choices *in light of other people's behavior*, not as a strategic response or accommodation to a realignment of resources associated with one's social position in the social system.

Many researchers argue that the fertility transition can be attributed to both structural change and diffusion. John Cleland contrasted this "blended" theory of diffusion with a "pure" theory. For example, if what is being diffused is information about family planning or new ideas and values about its use, then what Cleland referred to as a pure theory of diffusion may be plausible. According to Cleland, a pure theory holds that the diffusion of birth control as an innovation plays the decisive role, whereas a blended theory of diffusion posits structural transformation as the engine of demographic change, with diffusion merely serving as the lubricant. If information about the costs of children or the benefits of smaller families is being diffused, it may not be possible to separate the effects of diffusion from those of structural change.

Mark Montgomery suggested an inclusive view in which patterns of innovation may occur in a more or less predictable sequence. For example, an understanding of mortality decline might be followed by a clarification of the risks and benefits of contraceptive methods and then by a resolution of initial uncertainties concerning the benefits of schooling for children. Ron Lesthaeghe observed that a narrow view of what is being diffused will lead to an incomplete understanding of a fertility transition. Models of adoption of new fertility-related behaviors "should not be constructed with respect to diffusion of contraceptive knowledge and availability . . . but equally pay attention to diffusion of . . . perceptions of economic advantage and . . . cultural, social, and psychological obstacles" (Lesthaeghe and Vanderhoeft, 1998). The theme of inclusiveness and complexity was a common thread throughout the workshop.

Anthony Carter questioned whether or not an idea can be diffused without being transformed into something different. Citing Malinowski (1927), he explained that "any custom or artifact borrowed by one culture from another has to be 'reinvented' to fit into—to function in—its new setting. The borrowed element thus becomes something new." Such theories of cultural complexity have their parallels in linguistic theory. According to the latter, the meaning of a mes-

sage is not embedded in sentences uttered by one individual and heard by another. Rather, Carter said, "meaning is always the provisional outcome of interaction. It resides in relationships rather than linguistic forms or individual minds." In the example of ideas about fertility regulation, although societies may adopt new ideas about the use of contraception, they may justify these ideas in a way that corresponds to their traditions and culture.

Diffusion of Parity-Specific Fertility Regulation

Clear lines of disagreement emerged in the discussion of whether parity-specific fertility regulation is in fact an innovation that can be diffused. Cleland suggested that it is. He pointed out that not only did parity-specific fertility control become much more widespread in Europe between 1880 and 1930, but illegitimate fertility and marital fertility also declined at the same time (Knodel and van de Walle, 1979). This point of view is supported both by survey results (e.g., WFS) and by a significant amount of ethnographic evidence.

Cleland and Wilson (1987) argued that natural fertility was predominant in most large, pre-transition populations. Carter noted, however, that "parity-specific contraception can be achieved in the absence of modern contraceptives." He cited examples of societies that met the criteria for natural fertility, but practiced early stopping to control completed family size. However, it seems likely that even premodern societies probably acquired ideas about abstinence or other traditional methods from other groups.

David Kertzer suggested that methods of parity-specific fertility control that may have predated modern contraception, such as abortion and infanticide, could have actually been methods of controlling family composition. In addition, Cleland noted that there is a big difference between pre- and post-natal control, although the innovation is largely a moral one. He stated that deliberate control of fertility within marriage may have predated modern contraception through the use of such methods as coitus interruptus and prolonged abstinence. However, "the innovative element of pregnancy regulation within marriage may not take the form of new information about the biology of procreation but a more moral one of thinking (and then doing) the hitherto unthinkable."

To account for the complexity suggested by the above discussion, it may be necessary to develop a more comprehensive definition of diffusion—one more precisely tailored to the population and family planning context. One such definition was advanced by Karen Mason and Steven Sinding, who defined diffusion theories of fertility change as follows: "the spread or adoption of new information, ideas, beliefs, or social norms capable of influencing reproduction decisions and behavior that occurs through social interaction and influence, either at the interpersonal level or through impersonal channels such as the mass media."

MEASURING DIFFUSION EFFECTS

Measurement Difficulties

The principal challenge for researchers studying diffusion is the difficulty of measuring the effects of diffusion on the adoption of fertility control because of an inability to disentangle them from the effects of structural change. Diffusion is highly complex and may not be easy to measure accurately. For example, a common research finding is that television ownership is often negatively correlated with fertility levels. But television ownership may simply be an indicator of other social and institutional variables that are the true cause(s) of fertility decline. A key methodological issue, then, is that reliance on correlational evidence, as suggested by Peter Marsden, "provides little information about the process of behavioral change."

Palloni also noted this inability to distinguish between the results of diffusion and the results of structural change and the difficulty of identifying the process from the observable factors. Everett Rogers similarly addressed some of these issues, agreeing that it is not possible to control for the inputs that facilitate diffusion and that it is difficult to make the process visible. Part of the problem is the multiple interconnected elements that have an effect. Rogers noted that the direction of diffusion research is toward disaggregation, such as analysis at progressively smaller geographic levels (e.g., region to district, ward, village, and individual) with comparison across levels. There is also an increasing emphasis on village studies, in which it is possible to examine networks in detail. Rogers cited as an example the study by Entwisle et al. (1996) of Nang Rong district in Thailand, although the results of such studies can be difficult to generalize. Carter, however, noted that a community study need not be representative to be valuable. One can use the results from one study to hypothesize about how the results might differ in another area and then test that hypothesis.

Even village-level studies face problems of data collection. Both Barbara Entwisle and Steven Sinding commented on the overall lack of direct empirical evidence on the effects of social networks and interaction on fertility decline. One problem is that in order to understand the highly complex structure of social networks, it is ideal to have a detailed accounting of all the linkages between all individuals in a given context, a point made by several of the presenters. As Noreen Goldman noted, "these are data requirements that are difficult for any study to meet." Thomas Valente suggested that the difficulty of accomplishing the needed detailed accounting is exacerbated by several other methodological problems. Key among these is that time is an essential dimension of diffusion. Time of adoption is often the dependent variable in an analysis, and because the influences on adoption of innovations may occur over time, researchers must deal with time-varying independent variables and covariates. An additional problem is "right censoring," which occurs when the data are collected before the diffu-

sion has extended to all members of the community under study. Because of the difficulty of observing such a complex process over time, most diffusion studies have relied on cross-sectional data, which reduce confidence in their results to explain diffusion as a process through time.

Valente raised some additional methodological obstacles related to the measurement of personal networks. He noted the difficulty of measuring indirect influences and the need to account for the various sources of an individual's personal network exposure (i.e., the adopters in that person's network who provide information and influence). In addition, Valente said that there has been inadequate attention to the content of the network interaction and to the measurement of the exact time of adoption of an innovation.

Empirical Investigations of Diffusion Effects

Given the complexity and difficulty of studying the diffusion process, what work is needed to advance diffusion research? Although modeling and theoretical work is important, these efforts can be hampered by the many methodological difficulties. Montgomery suggested that mathematical approaches are probably now nearing their limits, and that it may be best to return to them after more empirical work has been done.

A number of suggestions were made with regard to the empirical work that would be of greatest value. Montgomery stressed the need for detailed micro-level knowledge of social organization and for empirical evidence of the complex information-gathering role of networks. Similarly, Marsden suggested that evidence is needed on "the fundamental question of how . . . actors go about constructing reference groups," including "in-depth studies of whose advice was taken into account in the course of an actor's adoption decision . . . to elucidate the underlying mechanisms." Steven Durlauf suggested that models of social interaction require "data that can be used to identify reference groups and other subjective attributes of agents." He described the research challenge of using insights offered by the various theoretical models of interaction to design survey instruments that can provide the data needed "to better measure the mechanisms conjectured to generate social interactions."

Specific suggestions regarding empirical work on the study of social networks and interactions included the following (with participant's name in brackets):

- Research focused on action groups—sets of people to whom individuals turn for support in solving problems. The resulting data could illuminate aspects of community structure that are salient for demographic outcomes. [Carter]
- Longitudinal studies to determine whether network exposure is associated with an increase in the likelihood of adoption at each time period of diffusion. The existence of time-varying variables and censoring (noted earlier) points

to the need to use event-history analysis techniques in studying diffusion. [Valente]

- Collection of data about how one's perception of the behavior of one's network partners influences one's own behavior. [Valente]
- Examination of the specific content of interpersonal interactions related to fertility control, such as what was said that encouraged an individual to adopt a birth control method and whether the encouragement was accompanied by information on how contraceptives work and where to get them (see, for example, Rutenberg and Watkins, 1997). Such micro-level understanding of the diffusion process could help in creating more effective programs to speed diffusion. For example, it might indicate what information is and can be provided by social networks and what needs to be provided by an external source in order to have more legitimacy and credibility. [Valente]
- Study of the interaction between the prevalence of a behavior and the conditions that promote interaction and communication or delay adoption of an innovation. For example, research might address the hypothesis that prevalence of a behavior increases more rapidly in homogeneous than heterogeneous groups. [Palloni]
- Examination of the hypothesis that the risk of adoption of an innovation is a positive function of its adoption by others, measures of individual connectivity (relational or structural), and exposure to external sources of information. [Palloni]
- In-depth ethnographic work to illuminate the crucial and complex role that cultural systems play in diffusion processes. [Kertzer]
- Triangulation in the collection of data on diffusion in order to derive multiple measures of the variables involved, to add confidence to the validity of the measures. [Rogers]

In addition to these suggestions for empirical study of social networks, Sinding addressed the empirical data needed to understand the effects of messages disseminated by family planning programs. To this end, it would be helpful to study the specific messages that pass between family planning service providers and their clients and how the clients interpret these messages. Sinding also emphasized the need to examine the effects of various types of information/education/communication (IEC) and mass media campaigns.

CHANNELS OF DIFFUSION

The channels through which diffusion may occur fall into two broad categories: social networks and mass communications. Although this distinction can be blurry, it can still be conceptually useful, and the workshop presentations tended to divide along these lines. In addition, within each of these broad categories, various specific channels can be identified. Social networks exist at the

personal level, at regional and national levels, and, increasingly, at the international level, and they may involve direct or indirect contact. For mass communications, the channels include television, radio, and the Internet, as well as print media. The various channels of diffusion are not only interrelated, but also mutually reinforcing.

Social Networks

A number of models have been developed to characterize the social networks through which diffusion may take place. As suggested by Kathleen Carley, individuals acquire and use information within networks composed of multiple sets of actors and connected by a variety of different relationships. The number and complexity of the social networks in which individuals are involved varies with the level of development and the cultural context. The implications of this for the diffusion of fertility control are addressed below.

Several characteristics of social networks were discussed by Marsden, who observed that the decision to adopt a new product, idea, or behavior depends on characteristics of both the individual and the surrounding social structure. Focusing on social structure, he identified two broad types of relationships that may exist between individuals. The first is social cohesion, which can involve either direct contact between actors or indirect ties, whereby influence is transmitted through intermediaries. Direct and indirect ties may also work together. For example, one actor's decision to adopt an innovation may be influenced by direct contact with another and amplified by the indirect influence of other actors that intervene between the two. The second type of relationship identified by Marsden is substitutability or equivalence of positions. Such relationships may also be of two sorts: structurally equivalent actors are substitutable because their relationships to other actors are identical; role equivalent actors are substitutable because they have similar relationships to similar types of actors. Structurally equivalent actors will also be role equivalent, but the reverse is not necessarily true. Neither structurally equivalent nor role equivalent actors need to have direct contact with one another; thus, the social mechanisms through which diffusion occurs between actors have to be specified.

Marsden noted that social networks can provide access to information about an innovation and influence the adoption of an innovation. Networks create "opportunity structures for contact and information transfer." They also influence the adoption of innovations by providing a mechanism for social comparison (Erickson, 1988). Decisions to adopt innovations are generally made in a context of uncertainty about the best action to take, and individuals tend to look to a reference group to determine the costs and benefits or the normative implications of adoption. The reference group may be one with which the individual has ties of social cohesion—either solidarity ties (e.g., kinship or friendship), which tend to link coequals and thus generate homogeneity, or linkages of authority, which

are asymmetric. Or the reference group may consist of peers (who are neither friends nor relatives) who hold similar positions within the social structure. The individual models his or her behavior on that of these structurally similar others, who need not even be aware of their influence (Marsden and Friedkin, 1993). Marsden noted that linking and interaction usually increase with attitudinal and behavioral similarity, so that the diffusion process alters the social networks involved.

Palloni offered a similar taxonomy of social networks, identifying four mechanisms of interpersonal relations that characterize the social context for adoption decisions. The first is relational linkages within a given setting or network. There are two significant aspects of these linkages: the density of individual connections and connections between actors inside and outside the network. The second mechanism is structural linkages, based on similarity of structural position (Burt, 1987). Unlike Marsden, however, Palloni noted that such linkages can result in either imitation or divergence (resistance to adoption), a matter that requires empirical study. The third mechanism is spatial proximity. Finally, fourth is the influence of culturally bounded groups (Strang and Tuma, 1993), defined by relations with others "based on definitions of actions, status, and purpose."

Homogeneity Versus Heterogeneity

The classic view of diffusion, expressed by Cleland, emphasizes the importance of homogeneity for the diffusion of an innovation. The use of contraception spreads rapidly throughout socially and linguistically homogeneous systems, regardless of the position of groups within the economic structure. The commonality of language is a particularly cogent factor associated with the spread of parity-specific fertility control in Western Europe during 1880-1930. Threshold theory, however, holds that there must be an initial level of acceptance before innovations can spread, even through a homogeneous population.

Assuming that an innovation is very likely to spread more rapidly among homogeneous groups, Lesthaeghe argued that the diffusion process begins with a small group of innovators who are capable of influencing the rest of the population. Similarly, Carley observed that "central" individuals—those with more connections to others—are more likely to acquire new information (Freeman, 1979; Weenig and Midden, 1991) and that individuals who are on the periphery of a social structure may be more likely to act on new information and thus generate innovative behavior within the group (Burt, 1973, 1980; Lin and Burt, 1975).

Highly homogeneous groups are not as likely as more heterogeneous groups to receive and be receptive to new ideas and behaviors. Increased levels of economic development open up new channels for diffusion, exposing new members of formerly homogeneous groups to more heterogeneous information and influ-

ences. Bongaarts and Watkins (1996) suggest that this process facilitates the diffusion of fertility control. These themes were reiterated by Carley, who, drawing on the evidence from the psychological literature on diffusion, noted that "information flows more quickly in integrated groups . . . but only if the groups are relatively small and have relatively simple cultures" (Carley, 1991; Kaufer and Carley, 1994). In addition, Palloni observed, "it is in homogeneous groups where sanctions are more likely to be applied efficiently against individuals who depart from conventional norms. Under these conditions, it would be individuals in heterogeneous social settings that would be more able to change their behavior."

Entwisle described the study she and her colleagues recently conducted in Nang Rong, Thailand, which addressed the question of the relationship between homogeneity and the adoption of a new form of fertility control (injection of hormonal contraceptives). In earlier work based on data from 1984, Entwisle et al. (1996) found that within each village of Nang Rong, one contraceptive method tended to dominate, because of "the conservative influence of local conversation networks on the choices made by individual women in Nang Rong." Between 1984 and 1994, the social world of the villages extended progressively beyond their boundaries as a result of migration, a dramatic increase in the spread of television, and major improvements in the road system. Entwisle and her colleagues tested two hypotheses in their most recent study: (1) distinctiveness in contraceptive method preference between villages decreases as the influence of local networks lessens and linkages to other villages and the national culture increases and (2) village centrality within a network of labor exchange in the district (i.e., the number of direct ties to other villages) is positively associated with increased adoption of the new method of contraception. She reported that the first hypothesis was supported by the data but the second was not. Indeed, it was found that village centrality had a greater association with the use of old methods than with the adoption of a new method. Citing several possible confounding factors, Entwisle noted that further work is planned to explore these unexpected findings.

A final point regarding homogeneity of social networks was made by Carter, who described the challenges to researchers who do empirical work on diffusion. The idea that communities are culturally homogeneous is rejected by some anthropologists. He suggested that "many anthropologists are prone to see rather less community and a great deal more variation in social structure. The dimensions of this variation include systems of kinship and marriage, social stratification, and relationships to state institutions." Kertzer expressed a similar point of view, citing evidence from nineteenth-century Italy that contradicts the idea that once contraception reaches a certain level, it spreads rapidly through a community. In Italy, heterogeneity in social class served as an obstacle to community-wide change.

Spatial and Emotional Proximity

Spatial proximity is generally assumed to facilitate diffusion because people tend to have more interaction with and be more influenced by those who are physically close. Spatial proximity also affects the flow of information between organizations and nations. However, Carley suggested that what matters most is not physical distance per se but *perceived* distance, so that communication bridges that appear to increase the physical proximity among people are thought to be critical to successful innovation (Allen, 1977). Thus, linkages through modern telecommunications can create a perception of proximity that replaces actual physical closeness.

As indicated in the discussion of homogeneity, the characteristics of those who are in close spatial proximity to one another may sometimes act as a barrier to rather than a facilitator of diffusion. This point was expressed by Palloni, who suggested that various mechanisms can operate to render spatial proximity a means to either promote or discourage adoption of innovations.

There is no consensus on the question of whether "strong" ties (connections to those with whom one has daily contact) or "weak" ties (connections to those whom one sees infrequently) are more important channels for the diffusion of innovative ideas. Indeed, even definitions of strong and weak ties are not standard (Granovetter, 1973). Cleland suggested that both are important, but emphasized the influence of those with whom one interacts daily. Citing the work of Susan Watkins and her colleagues in South Nyanza, Kenya, he noted that "the experiences of close friends, neighbors, and relatives appear to be of particular importance." Carley, in contrast, pointed out that individuals are more likely to seek information that is sensitive, unknown, or threatening from those with whom they have weak (or irregular) ties (Granovetter, 1973). Montgomery suggested that the social identity of other actors in a network—the depth of information they possess, their credibility, and force of example—may determine whether a weak tie is activated. The study in Nang Rong by Entwisle et al. (1996) was specifically designed to explore the influence of weak ties on method diffusion, but the study results were mixed.

With regard to direct (personal) versus indirect (impersonal) ties, the former appear to be more important for diffusion. Goldman described a study conducted to examine the diffusion of beliefs about hygiene—specifically with regard to diarrheal disease—in rural Guatemala. Goldman and her colleagues hypothesized that belief in the link between hygiene and diarrheal disease would be most common among women who knew others outside the community and among those living in communities that had significant contact with the outside world. They also hypothesized that women who were involved with community organizations or who had family members who were involved in these organizations would be more likely to hold such a belief because of their increased contact with innovative ideas circulating in the community. The study results showed that personal

contacts exerted a greater influence on beliefs than did impersonal contacts (the latter being represented by exposure to mass media and the presence of a water committee in the community). In particular, having a relative living abroad or in Guatemala City proved to be the most important channel for hygiene-related beliefs; participation in community groups was also significant.

That is not to say, however, that indirect or impersonal ties have no role in diffusion. As suggested by Marsden, indirect ties may operate through intermediaries—exemplified by the "innovators" who are first to adopt a new technology or behavior. Moreover, the influence of ties of structural equivalence may not involve direct contact at all. Citing Weimann (1994), Marsden also noted that opinion leaders and their social networks have a far greater influence on adoption of family planning innovations than they do on creating awareness of these innovations.

Mass Media Effects

It is impossible, of course, to discuss the role of diffusion without addressing the role of mass communications, particularly television. Just 15 years ago, many countries (e.g., China, India) were not broadly exposed to mass media, especially television. Today the situation is quite different. There is evidence in Brazil that, even among poor families, one of the first major purchases that many people make is a television, and the most-watched programs are news and soap operas (Hornik and McAnany, 1998).

Television is often an important source of new information. Carley cited Gantz et al. (1986) in noting that 80 percent of subjects discussing a local news event got their initial information about the event through interpersonal channels, but they received follow-up details predominantly from the mass media. Carley suggested that "the mass media often become the primary source of details on new information because of its one-to-many capabilities and its ability to transmit an encapsulated message with less change in that message." Goldman reported that general programming on radio was not found to be a significant source of information about hygiene norms in Guatemala. However, she suggested that since so many rural women listen to radio or watch television frequently, those media might be used to transmit specific health-related information.

Robert Hornik cited evidence of the very strong association between access to mass media and fertility at several different levels. At the national level, estimating a regression equation for 102 countries shows that television sets per capita accounted for 82 percent of the variance in fertility in 1990 (excluding three oil-rich countries that were statistical outliers). In addition, Potter et al. (1998) found a large association between television ownership and fertility at the municipality level in Brazil. Finally, Westoff and Bankole (1997) have demonstrated the association between media access and fertility intentions and behaviors for individuals in seven African countries.

One potential problem with many studies of mass media effects is the possibility of selection bias. At any time, those who are already using contraception or who are considering using contraception are likely to be the most receptive to media messages about contraceptive use. In cross-sectional studies, this will result in an association between contraception and mass media messages that is not due to the latter affecting the former (Westoff and Rodriguez, 1995; Bankole et al., 1996). While acknowledging the need for caution in drawing causal inferences from correlational data, Hornik noted that relationships between television and fertility are as strong as or stronger than those between gross national product (GNP) per capita and fertility, and are still statistically significant when controlling for GNP. Hornik cautioned against automatically concluding that individual exposure to television results in individual fertility reductions. Rather, the evidence indicates aggregate-level effects: nations or municipalities in which television is more widely available are those in which there is lower fertility.

Hornik set forth four hypotheses about the pathways through which the media may influence fertility:

- Time spent with the media may mean less time spent with other activities, such as socializing (which may in turn relate to age at first marriage and the prevalence of nonmarital sex) and marital sex. The cost of purchasing and maintaining a television may also compete with the costs of childbearing.
- Television content typically reflects Western patterns of consumption that compete with childbearing and values associated with reduced fertility, such as women having smaller families or delaying marriage in order to achieve a career. The world depicted on television may influence the ideas of elites on fertility-related investments, such as deliberate family planning efforts, health care, female education, and social security.
- Media content may also include more direct messages related to fertility decisions. For example, a soap opera might depict a couple deciding to limit family size or delay childbearing, while a news program might provide information about local clinic services or new government policies favoring reduced fertility.
- Family planning programs may use deliberate information, education, and communication efforts through mass media to increase awareness of the need for fertility control, provide information designed to increase utilization of available services, or market specific products.

From a policy perspective, it is useful to know whether direct, program-related messages or indirect, more generalized, longer-term messages are more effective in diffusing fertility control. In reviewing the evidence on direct messages, Hornik observed that their effects appear to be limited in two ways. First, they help increase demand for clinics but do not seem to show clear effects on individual-level behavior. Second, their effects last only as long as the media

program is ongoing. Thus, direct messages would appear to have short-term effects on those who are ready to act but need a final push. Indirect messages, however, may have their greatest effect on those who are aware of a new behavior, but do not yet intend to adopt it. This influence may occur over a substantial period of time and require repetition and reinforcement through multiple channels (as discussed below). Finally, Hornik suggested a further type of media effect: "the effects of continuing messages delivered through the IEC [information/education/ communication] efforts of general pro-family planning programs . . . not in the context of a discrete intervention." Study of the influence of such messages may reveal longer term effects than those observed in short-term evaluations of discrete programs. Of course, it should be noted that IEC campaigns may be viewed by some as propaganda rather than policy.

Many of the workshop participants agreed with Hornik's emphasis on the importance of indirect messages. Joseph Potter, for example, presented evidence from Brazil that indicates that television "reinforced the incorporation of audiences into a national consumer market, attached ideas and values concerning family structure and women's role in society, promoted a strong positive image for consumption, and prompted new ways to think about the relation of sex and reproduction" (see Faria and Silva, 1983; Faria, 1988; Faria and Potter, 1990, 1997). Potter suggested that diffusion through Brazilian television is strengthened by the fact that there is no explicit government policy to promote family planning, as well as by "the highly autonomous, dynamic, and uninhibited nature of Brazilian television programming." According to Potter, Brazilian television programming transmitted messages that promoted consumption and a consumer-oriented lifestyle that is incompatible with having large numbers of children, as well as the preservation of youth and beauty. Small families were consistently depicted, as were modern gender and intergenerational relations. The accomplishments of modern medicine—relevant to the eventual emphasis in Brazil on surgical sterilization during cesarean section deliveries—were also underscored.

Other Channels

Channels for diffusion include not only ties to individuals or the mass media, but also ties to entities ranging from family planning programs to government to international organizations to the global community (through modern telecommunications such as the Internet). Mason and Sinding argued that the role of population policies and programs on the diffusion of fertility control is often underestimated. They observed that there actually is strong evidence for the effects of population policy on fertility decline, but that such effects are often "accelerative" rather than "originative" and are at times ineffective, especially in the least-developed countries. Mason and Sinding cited specific evidence from "countries in which structural conditions for fertility change have been inauspicious or even antithetical to change, but in which population programs were insti-

tuted or strengthened and fertility declined rapidly thereafter." They suggested that the "diffusion" created by family planning services is a diffusion of technical knowledge and information about the location of the nearest services.

There is no clear evidence on whether programs and policies also influence the demand for children by diffusing ideas about the value of children and alternative means of enhancing family socioeconomic status. Sinding suggested that governments have played an important role in fertility decline by sanctioning a form of behavior that represented a revolutionary change in what institutions had been teaching. Duff Gillespie agreed that governments can play an active role in the diffusion of new ideas. He suggested that more emphasis should be placed on the "social engineering" aspects of diffusion of fertility control: he noted the example of how government support in Bangladesh and India helped to diffuse knowledge of the benefits of oral rehydration therapy for infants suffering from diarrhea.

Susan Watkins presented a rich and highly detailed history of the transformation of population ideology in Kenya. The conventional view emphasizes the activities of the Kenyan government, but her account stressed the vital and frequently neglected role that the international population movement played in this transformation. "The global networks disseminated and altered population ideologies" and influenced Kenyan elites. Watkins suggested that Kenyan elites had little inclination to adopt the ideologies of the population movement, but did so for two primary reasons. First, the Ministry of Economic Development and Planning was influenced by neo-Malthusian logic. Second, however, the Kenyan elites "wanted to signal that Kenya was not a backward nation, that it was a member of a global community."

This increasing role of globalization—both economic and cultural—must also be acknowledged. Gillespie emphasized the importance of "global dynamics" or "sea changes," although such influences are difficult to analyze. Bongaarts and Watkins (1996:668) make the following distinction:

> National channels of social interaction are particularly relevant in understanding the pace of national fertility transitions once they have begun, whereas global channels are particularly relevant to the timing of the onset of fertility transitions across countries and thus to the pace of global fertility transition . . . . Given current levels of economic development and the proliferation of global channels of interaction, we expect that over the next three decades or so few countries will fail to experience the onset of a fertility transition.

Yet another key point to emerge from the discussion of the various channels for diffusion was the mutually reinforcing effects of multiple channels. In discussing various types of linkages between individuals, Marsden suggested that "in the idealized case, direct and indirect influences reinforce one another." In particular, a direct connection can be reinforced by several indirect connections. Montgomery emphasized the dynamic nature of diffusion, especially the multi-

plier effect through which the information diffused by a program can spread through social networks. This point was also emphasized by Hornik, who noted that through social networks, "the effects of mass media diffuse beyond those who are directly exposed to the content." Indeed, Hornik suggested that people may change their behavior "when many aspects of their environment communicate new messages in a repeated and reinforcing way over time."

Sinding cited Kenya as an example of the kind of multifaceted diffusion approach that appears to be most effective for policy makers. Diffusion of fertility control in that country involved a formal information/education/communication program, speeches by the president, village meetings, calendars, field workers visiting households, and village women gossiping about family planning. Thus, the effect of any one channel cannot be separated; rather, emphasis should be placed on the way in which various channels can collectively encourage the adoption of ideas, values, and behaviors associated with fertility decline. More research is also needed on the specific messages that are passed from providers to clients and how these messages are interpreted.

DIFFUSION VERSUS ECONOMIC DEVELOPMENT AND STRUCTURAL CHANGE AS EXPLANATIONS OF FERTILITY TRANSITIONS

Theories about economic development and theories about diffusion are both rational explanations for the fertility transition. It seems quite plausible that people change their fertility behavior in response to changes in their socioeconomic status, changes in their knowledge about and access to contraceptives, and changes in norms about family size.

Diffusion Theories Versus Economic Theories

The debate on the roles and relative importance of diffusion and structural change in fertility transition has been one of the most active debates in the demographic literature on diffusion, and the workshop discussion reflected it. Few people would argue that either cause operates entirely by itself; the issue is how much emphasis should be placed on each.

Structural changes that could affect fertility could include both economic changes, such as changes in labor markets and increases in the costs of schooling, and noneconomic changes, such as increases in child survival. During the workshop, Cleland gave little weight to economic changes alone. Having defined the blended and pure versions of diffusion theory discussed earlier, he suggested that the pure version is not a plausible explanation for fertility decline in the developing world. He proposes that diffusion of birth control in these countries has followed declines in infant and child mortality and is *not* a response to structural economic change: "Fertility decline in the developing countries is essentially a

lagged response to improved survival. . . . I see little explanatory space for transformations in the economic value of children." In contrast, for the European transition, the spread of marital fertility control does not appear to have been linked to mortality decline. Thus, according to Cleland, "The pure version of the innovation-diffusion explanation remains compelling for this region of the world."

Cleland's views were not widely shared. Lesthaeghe, for example, responded by stating that a correct reading of the results of the Princeton European Fertility Project would not give exclusive credit to cultural forces. To illustrate, he cited Knodel's (1974) analysis for Germany, which emphasizes structural and economic change. Lesthaeghe voiced the view of a number of the workshop participants when he stated emphatically that the explanatory power lies not in culture *versus* economics, but in culture *and* economics. In the European work, he explained that adding cultural variables to the model increased the model's explanatory power.

Indeed, the issue of whether the two phenomena can be separated was addressed by several of the workshop participants. While Palloni had earlier highlighted how many researchers distinguish between these two competing theories of fertility transition, he now argued that in fact they cannot be considered to be separate—a point that has obvious implications for whether it is possible to disentangle the effects of the phenomena in order to study them (Palloni, 1998:3):

> Analytically useful diffusion models require theorizing about social structures, about the positions that individuals occupy in them, about individual decision-making processes that accompany adoption of a behavior, and about the constraints these individuals face. I conclude that it is unilluminating to confront diffusion theories with competing explanations that regard behaviors as responsive to "structural" factors, such as socioeconomic positions or social class membership, as if diffusion processes did not require or could proceed independently of structural factors that characterize the environment where individuals act and where behaviors take place.

Researchers who pit diffusion against structural change are making a spurious distinction, he continued, since both have their basis in rational decision-making on the part of individuals (Palloni, 1998:9):

> Diffusion only occurs because individuals decide to adopt after observing others do so, and after updating their information by including observed outcomes associated with others' adoption into their own decision making process. . . . A diffusion model rests on assumptions and imageries not dissimilar to the ones that prevail when, for example, we refer to individuals changing their fertility behavior as a result of socioeconomic changes that affect them (the so-called demand theories of fertility). The vast majority of applications of diffusion models in both demography and sociology neglect this very simple tenet of diffusion models: adopters and non-adopters are rational decision-makers and adoption is the outcome of a rational decision-making process.

Carter took a similar position. Yet while Palloni argues that social interaction must be understood in the context of rational decision making, Carter (1998:31) posits that individual rational choice must be placed in the context of social learning:

> In the population studies literature, social learning is held to be conceptually distinct from individual rational choice even though the results may be empirically indistinguishable. But if learning is always social, it is not clear what space is left for economic accounts. How would actors make economic choices if they did not know of the existence of behavioral options and if they were ignorant of their risks and normative evaluations? How would they learn of these things except through interaction with others? What would nonsocial learning consist of? When we observe social learning are we not also observing the socially distributed character of economic decision-making?

Similarly, Kertzer suggested that economic systems may best be viewed as cultural constructs. Thus, economic change is also cultural change.

Durlauf described the parallels between the view that diffusion and structural change are inseparable and the emergent economic theory of social interaction. In the latter theory, "the role of individual incentives emphasized by economists is integrated with the social norms and networks stressed by sociologists." The implication for the issue at hand is that "the diffusion process is not simply a mechanical 'carrier.' Rather, the behavior or factors giving rise to the social interaction are an integral part of the theory that make it impossible to separate the diffusion process from its source(s)." Durlauf presented a model based on this symbiosis that can be used to analyze the adoption of modern contraception.

Durlauf agreed with Cleland's depiction of a blended diffusion theory, in which structural transformation is the main mechanism of fertility change and diffusion merely facilitates the process. Although he emphasized the critical role of social interactions, he concluded that those interactions alone are not sufficient. He posited that "economic conditions drive the process, [and] are then amplified by social interactions." Yet he emphasized what he referred to as "the insight of the social multiplier": economic conditions need only change enough to get a few early adopters to switch behavior. Then once in play, endogenous exchanges among agents (i.e., social interactions) ultimately drive the fertility transition.

Palloni introduced the idea that "as the process of adoption of [an] innovation progresses, the social and economic environment are modified by the process of adoption itself." He noted that diffusion transforms the social structure in which it occurs, and this transformation feeds back into the diffusion process. For example, early adopters of fertility control can provide more education for their children, thus acquiring more power and prestige. This in turn may lower the costs for others of adopting birth control. Carley made a similar point, noting that diffusion alters both the underlying cognitive and social structures of those

involved. Such endogenous feedback further complicates analysis of the underlying process of change.

Lesthaeghe offered a mathematical formulation of the interaction between diffusion and structural change, adapted from the three well-known preconditions for the adoption of a new mode of behavior: being ready, willing, and able (Coale, 1973). Lesthaeghe explained that success with respect to the adoption of a new form of behavior is dependent on meeting the three preconditions *jointly*, "and that the outcome will be determined by the weakest link among the three." Thus, he regards the "'economics versus culture' formulation as a dead-end street" (see also Lesthaeghe, 1997).

Lesthaeghe presented a conceptual model for the interaction among the three preconditions; applied this model to Montgomery and Casterline's (1996) formulation of the impact of social factors; and used the model along with data from the Demographic and Health Surveys (DHS) to categorize African women on a scale from ready, willing, and able (RWA) to none of these, and to identify bottlenecks to adoption based on the planning status of the next pregnancy. The results of the exercise indicate that "factors associated with low readiness and ability tend to be responsible for the bottlenecks at the onset but that the willingness condition is likely to become the weakest link at a later stage." The results also suggest that the nature of nonwillingness shifts over time from being associated with ethical, religious, or social objections to being based on health-related fears. There are clear policy and program implications of these findings (see last section of this report). Throughout, Lesthaeghe stressed that a failure to consider all three preconditions and their interactions will lead to an incomplete understanding of the fertility transition in a given setting.

Sinding observed that it is difficult to separate diffusion by a family planning program from the causal impact of structural economic changes if among the notions diffused by the program is the idea that there are economic benefits to small families.

Importance of Cultural Context

Lesthaeghe also emphasized the importance of context or culture in determining the relative roles of Coale's ready, willing, and able components: "The correlations between R, W, and A can vary substantially across contexts (e.g., countries, neighborhoods, social groups), and the assumption of complete endogeneity of W is not likely to hold. For instance, counterpropagation or gossip about the physical effects or comfort of contraception can reduce willingness considerably, even if R and A would be high." Determining the mix of ready, willing and able in a particular setting and identifying the contextual or cultural factors that influence this mix is essential if family planning policies and programs are to deliver appropriate messages to encourage the adoption of birth control.

The essential role of context or culture in fertility transitions was emphasized by several other participants. As noted above, Cleland stated that fertility decline in the developing world should be viewed basically as a lagged response to declines in infant and child mortality. He suggested that "the length of the lag probably depends on cultural and political factors that condition the ease with which, and the speed with which, the new reproductive regime is incorporated." Durlauf suggested that variations in context "characterized by the level and relative importance of economic and cultural factors" account for differences in the level of economic development that will initiate a fertility transition. "Some cultures," he noted, "may possess strong proscriptions against fertility control or the economic benefit of children may be so large [as] to mandate high levels of economic development to induce even a few individuals to change their behavior." Kertzer agreed and cited Cleland's failure to address class and gender differences, suggesting that "economic, demographic, and political factors all play a role—but all within the cultural context."

Similarly, Palloni emphasized that "diffusion processes are affected by the social structure of the systems within which they are occurring." In particular, sociocultural factors are an important determinant of the rate of diffusion in a given setting, and, as also suggested by Lesthaeghe, can as easily hinder as facilitate adoption: "the observed regional clustering of fertility changes in Western Europe could be explained by social or economic factors that halted or slowed down a diffusion process already on its way in other regions."

Sinding offered a counterpoint to the emphasis on cultural differences. He observed that increasing globalization and the spread of mass communications act to counterbalance the importance of such differences—for example, by spreading ideas about the benefits of small families and fostering the desire for more consumer goods.

PUBLIC POLICY IMPLICATIONS AND CONCLUSIONS

The workshop highlighted many facets of diffusion research and their implications for population policy in developing countries. It seems clear that diffusion contributes to the determination of the timing and pace of fertility change. While it may be impossible to separate the effects of diffusion from the effects of structural change on fertility transitions, the available evidence indicates that both effects exist and, indeed, that they usually reinforce one another.

Mason and Sinding (1998) argue that family planning programs, and population policies generally, have contributed to that decline; they diffuse technical knowledge of and physical access to contraception. Programs have helped to speed up the fertility decline in some countries and therefore slow overall population growth.

According to Mason and Sinding, diffusion research can, in turn, help to inform the policies that these programs follow. It is widely accepted that both

mass media and social networks can diffuse knowledge of and access to contraception and can help to ease fears about adverse health effects associated with the use of contraception. In many settings, they may be decisive in legitimizing birth control and family limitation.

Fertility decline is not the universal goal of all countries. But for the majority of developing countries that do wish to lower their fertility rates, what guidance can diffusion research offer? Currently, diffusion research may help to improve population policies in at least three ways. First, research indicates that family planning programs may be successful even in areas where structural conditions do not appear to be favorable to fertility change. Diffusion of new ideas about family planning may even lead to structural change. Program planners should not shy away from "underdeveloped" regions, but rather implement family planning programs in all types of settings. Strong political leadership in support of family planning may be key, especially in areas with low income and poor literacy. Second, diffusion research indicates there are powerful strategies for encouraging fertility decline that do not entail the use of incentives, targets, or coercion on the part of a government. Developing a communication infrastructure, for example, may help to contribute to fertility decline by helping to diffuse messages about "modern" ideas, such as smaller family sizes. Finally, some specific features of family planning programs may be especially influential because of diffusion dynamics. For example, providing information about potential health side effects from using contraception and their treatment can counteract the damaging effect of the informal spread of fears of side effects. Programs must provide clear, accurate information about these side effects, as well as providing appropriate follow-up treatment and counseling. In addition, family planning programs can gain from interpersonal communication by making use of clubs or discussion groups or enlisting community members as instructors. All such efforts should be informed by an understanding of the local social structure.

In conclusion, more research is needed on models of the diffusion of family planning knowledge and technology, on the measurement of diffusion effects, and on the implications of diffusion research for population policy and programs. The Workshop on Social Processes Underlying Fertility Change in Developing Countries was part of this ongoing exploration.

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Appendix
Workshop Papers

KATHLEEN CARLEY
"Learning and Using New Ideas: A Socio-Cognitive Perspective"

ANTHONY CARTER
"Culture and Communication: Anthropological Perspectives on Diffusion and Social Processes"

JOHN CLELAND
"Potatoes and Pills: An Overview of Innovation-Diffusion Contributions to Explanations of Fertility Decline"

STEVEN DURLAUF AND JAMES WALKER
"Social Interactions and Fertility Transitions"

BARBARA ENTWISLE AND JENNY GODLEY
"Village Networks and Patterns of Contraceptive Choice"

NOREEN GOLDMAN, ANNE PEBLEY, AND MEGAN BECKETT
"Diffusion of Ideas About Personal Hygiene and Contamination in Poor Countries: Evidence from Guatemala"

ROBERT HORNIK AND EMILE McANANY
"Mass Media and Fertility Change"

RON LESTHAEGHE AND CAMILLE VANDERHOEFT
"Ready, Willing, and Able: A Conceptualization of Transitions to New Behavioral Forms"

PETER MARSDEN
"Diffusion Through Social Networks"

KAREN OPPENHEIM MASON AND STEVEN SINDING
"Diffusion Theories and Population Policy"

ALBERTO PALLONI
"Diffusion in Sociological Analysis: How Useful Is It for the Study of Fertility and Mortality?"

JOSEPH POTTER, RENATO ASSUNCAO, SUZANA CAVENAGHI, AND ANDRE CAETANO
"The Spread of Television and Fertility Decline in Brazil: A Spatial-Temporal Analysis, 1970-1991"

EDUARDO RIOS-NETO, PAULA MIRANDA-RIBEIRO, AND JOSEPH POTTER
"I Saw It on TV: Television and Demographic Change in Brazil"

SUSAN WATKINS AND DENNIS HODGSON
"From Mercantilists to Neo-Malthusians: The International Population Movement and the Transformation of Population Ideology in Kenya"