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A. O.Tsui*, A. I. Hermalin,[2] J. T. Bertrand[3], J. Knowles4, J. Stover and K. J. Stewart[5]

Evaluating Family Planning Program Impact: Need Initiatives on a Persisting Question

THE question of whether family planning programs themselves lead to lower birth — rates is a persistent issue. From the earliest days of the international family planning movement, systematic efforts to evaluate these programs have been made (e.g., Berelson *et al.* 1966). The discussion around the impact question has wrestled with the magnitude, significance and validity of fertility change attributable to family planning program interventions and with the economic, health and familial rationales justifying their existence. At some point in the professional lives, most members of the population field have been exposed to and participated in this discussion; and still, the question persists into the present (e.g. Phillips and Ross 1992; Bongaarts *et al.*, 1990).

The question has been addressed by various quarters, both academic and non-academic. The answers range from clear, unqualified affirmations to clear, unqualified negations, with most lying somewhere in between. Within the past five years or so, however, the question of family planning programs' demographic impact has been a less prominent issue. A certain accommodation to the institutionalized role of family planning programs appears to have settled in the population community. Funding for family planning services, both by donors and national governments, has increased, at least in current dollars; and the increased practice of modern birth control suggests future demand for family planning will remain strong. Why then should one speak of new initiatives for evaluating impact?

A principal reason is a recent upswing in concern over the likely scarcity of resources from donors and developing country governments to meet projected future needs for contraceptives (e.g., Gillespie *et al.* 1989; Mauldin 1991). Projected shortfalls in contraceptive supplies have increased pressure on donors, like the U.S. Agency for International Development (A.I.D.), United Nations Population Fund, and the World Bank, to raise their levels of assistance to needful countries. In turn, this has spotlighted the accountability of their present and past efforts. Those engaged in the programming and disbursement of these funds are being asked or are asking themselves questions about how effective the investments have been (e.g. Bulatato 1993) and how efficiently

' University of North Carolina at Chapel Hill;[2] University of Michigan at Ann Arbor, 'Tulane University; * The Futures Group;[3] Johns Hopkins University School of Public Health.

they have been used. What are the population-based impacts of this assistance? How well have donors coordinated their funding of country programs: and, equally important, do these programs manage and use their own and contributed resources effectively? The answers to these questions will determine the volume of future resources and their allocation.

Consensus is building that new effort to systematically and rigorously examine family planning program performance and impact are needed to address these questions. Methodological development in family planning program evaluation has, for all practical purposes with a few notable exceptions (e.g.. United Nations 1979, 1991;
Mauldin and Ross, 1991; Lapham and Simmons 1987; Fisher *et al.* 1992), been fairly moribund. On the other hand, a 'family planning industry' has arisen, which has emphasized service production over R&D (research and development). The challenge now is to increase the efficiency of this industry's resource consumption and raise its impact through more effective program engineering, product development, and market orientation.

The objective of this paper is to identify needed initiatives to address the means by which the family planning program impact question can be answered more fully and comp letely. The paper begins by providing the historical context surrounding the question of family planning program impact and the variability of answers. It then identifies and discusses several major conceptual and technical development needs. It ends with a metaphoric illustration of family planning evaluation as a set of interconnected activities that must draw upon many data sources and utilize a range of indicators and analytic strategies. While efforts to fulfill these needs can significantly advance the current family planning program evaluation capabilities of governments and donors, the discussion and suggested improvements here are by no means exhaustive. Family planning evaluation data systems and methodologies have not advanced substantially in recent years. If the field can be re-invigorated with scientific and programmatic attention, a second-order growth of ideas, strategies and techniques should be forthcoming.

The Evolution of Programs and Program Evaluation

Organized efforts to provide information about and services for family planning are not static enterprises. Over the past three decades, family planning programs in developing countries have evolved considerably as a result of experience, changing socio-economic and political conditions, and the diffusion of ideas and practices. Changes in program goals, structure, and operations have also been precipitated in part by a growing understanding of how programs achieve effects. These program changes in turn give rise to new questions and the need for additional information and analysis. Like the programs themselves, the techniques for evaluating family planning programs have evolved over time in response to available data, the questions posed, and the increased understanding of the dynamics of fertility control on the individual, community, and national level.

Family planning evaluation can be directed to the immediate, intermediate and

ultimate goals of programs. Attention is usually given to measuring the amount of program effort or output, the effects of that output, the adequacy of effects in relation to targets, and cost efficiency. A large number of techniques employing a wide variety of data have been developed. A distinguishing feature of family planning program evaluation is that it has attracted a wide array of family planning practitioners with long field experience as well as academic social scientists with many areas of specialization (often with first hand knowledge of programs). Thus, unlike much social program evaluation that relies on existing paradigms, family planning program evaluation has been a major contributor to basic research in measuring and understanding fertility and fertility control.

The evolution of developing country family planning programs and their evaluation strategies over the past three decades can be described in three phases (Hermalin and Entwisle 1982):

Phase 1: *Developing Supply to Match Existing Demand*

In the earliest stage of family planning program efforts (roughly 1960 to the early 1970s), the emphasis was on developing the supply to meet the level of existing demand, recruiting and training personnel, developing service points, setting up appropriate supervision and reporting procedures, and so on. Many programs offered only a limited number of contraceptives, often through established medical public or health facilities; and there was little competition from private or commercial sources.

In this environment emphasis was placed on measuring output and performance (the number and characteristics of acceptors) and estimating the fertility impact on those acceptors. To this end, service statistics were the major data source; and acceptor-based methods, such as couple-year of protection (CYP), component projection (e.g., CONVERSE) and reproductive process analysis, or the foundations of these methods, were developed to assess impact.

Phase II; *Understanding and Enhancing Demand—The Emergence of a Marketing Strategy*

The second phase (from the early 1970s to the early 1980s) saw the emergence of a much broader marketing strategy. More attention was paid to understanding demand; and large-scale surveys, like the World Fertility Survey, became the vehicle for understanding the individual determinants of contraceptive use, reasons for non-acceptance, fertility preferences, and past and current fertility. At the same time, programs became increasingly complex; and there was considerable diversification in the provision of supplies and services through community-based distribution and the incorporation of the private and commercial sectors. The growing complexity of programs coupled in many cases with rapid social and economic development led to the emergence and reliance on population-based methods of evaluation. These included prevalence models that utilized the data on proxi-

mate factors from the surveys (Bongaarts 1986). areal multiple regression techniques (Hermalin 1979), and, to a certain extent, demographic decomposition (United Nations 1979) and trend analysis (Mauldin 1989). Matching studies or experimental designs (Wells 1979) were used in both periods to examine relevant issues such as acceptor-nonacceptor matches to study fertility outcomes in Phase I or experimental designs to study the effect of different incentives or delivery approaches in Phase II.

Phase III: *Emergence of the Full Marketing Strategy*

In this latest phase, since the mid-1980s, family planning programs have become much more sophisticated in combining attention both to the determinants of demand, and the ways of influencing it, and in giving closer scrutiny to the components of the supply environment and their effects. On the implementation side, programs have become even more complex in utilizing a wide variety of systems for service provision and examining the degree of accessibility and the quality of service actually experienced by current and potential users (Entwisle *et al.* 1984; Tsui and Ochoa 1992). This multifaceted approach involves understanding the supply environment, the structure of demand, and the reaction of demand elements to each facet of supply. There is recognition of the importance of ideational, as well as structural, change (Cleland and Wilson 1987), suggestive of the potential influence that family planning program outreach activities may have on socio-cultural norms about reproduction and its control. However, the science to explain the dynamics of programs, and therefore their impacts, is still very much under development. With respect to evaluation, the attention on program features has led to multilevel analytic approaches that combine individual data from surveys with information about the supply environment obtained from special modules, administrative records, and so forth. Experimental and quasi-experimental designs are being used, often in small operations research projects to test different program options, but occasionally in large-scale designs, as in the Matlab project, to study the effects of alternative strategies on fertility.

The diversification of program organization and structure, the increased reliance on periodic national sample surveys over program service and management statistics, and the growing complexity of evaluation questions to be answered have identified areas where present evaluation capabilities are lacking. These developments have also created the need for new initiatives to provide high-quality results to a broader base of constituencies and to address the emerging issues surrounding the record of program impact and the cost effectiveness of those investments.

Framing the Conceptual Relationships

To advance family planning evaluation, a necessary first step is to have a clear conceptualization of the linkages between family planning 'program-level' inputs and the targeted 'population-level' outcomes. Several different paradigms have been developed (e.g., Lapham and Simmons 1987; Reynolds 1990; Hermalin 1983), in which

causal prominence has been given to factors governing individual demand for contraception. These paradigms have not emphasized the structural and operational characteristics of the family planning intervention as they might affect both contraceptive demand and use. Recent work by researchers such as Simmons and Simmons (1987) and Simmons and Phillips (1990) helps flush out the sociology of organizational behaviour as this interacts with the sociology of human behaviour in determining fertility levels. The importance of developing a model that integrates both the biological and social determinants of the demand for fertility and contraception with the political and programmatic determinants of the supply of contraception is. this paper contends, critical to achieving significant progress in family planning evaluation. An integrated model of both contraceptive demand and supply, with tested construct validity, can identify the key causal components and outcomes. This can lead to standardized definitions of indicators that will be useful for monitoring both consumer demand and program performance. The model also provides a basis for specifying structural models of individual behaviour that have strong contextual orientations, in that influences from service environment factors can be simultaneously considered with those characterizing the individual. These points are elaborated below.

A conceptual framework with this integration in mind is proposed in Figure 1. The external influences of societal and individual factors are shown with respect to their effects on the value and demand for children. Similarly, the framework relates the effects of socio-economic development and welfare programs, including family planning, on the value of and demand for children. The latter determines the level of family planning demand either for spacing or limiting purposes. Prior levels of wanted and unwanted fertility also influence family planning demand (via the feedback arrow). Family planning supply factors, which are detailed in Figure 2 in the sequel, are hypothesized to produce three main service outputs—service access, quality and image or acceptability. The supply factors and outputs can influence family planning demand through awareness generation of and motivation for services.

Demand for contraception can materialize directly as practice, if non-artificial means, such as rhythm or withdrawal, are adopted. Or. practice may be facilitated through the utilization of family planning services, in which case a program method, such as pill, IUD or sterilization, is adopted. The nature of the service interaction is important for its 'point of sale effects" as these determine the quality of client care and whether, how effectively and for how long contraception is used. The influence of family planning supply on contraceptive practice, thus, is conceptualized to be either through encouraging service utilization or through modifying family planning demand. Ultimately, fertility is affected either by contraception or the other intermediate variables (e.g., postpartum infecundity, abortion and coital frequency), the latter also having direct effects on contraceptive use.

' Elsewhere these are called 'client-provider transactions' or 'provider-user relation'.

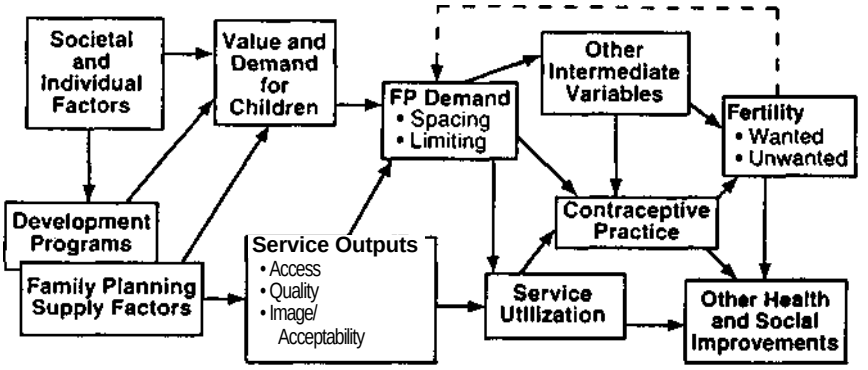

Fig. 1. Conceptual Framework of Family Planning Demand and Program Impact on Fertility

Health and improvements to social wellbeing are other ultimate outcomes hypothesized to be influenced by either exposure to family planning services (such as when their provision is integrated with maternal and child health), fertility change, or con-. traceptive use. Health benefits from oral contraceptive use include, for example, reduced productive tract infections and iron deficiency anemia (Ory 1982). With respect to the social consequences of fertility. Knodel and Wongsith (1991) have found family size to exert a substantial negative effect on the probability of higher levels of schooling in Thailand.

The conceptual framework does not explicitly identify psychic, social and economic costs associated with both fertility and family planning but treats these implicitly. Such costs arise through the interaction between demand and supply, whether with respect to fertility or contraception.[2] As the program's supply of services interacts with the couple's demand for fertility or family planning, these costs emerge as price constraints on their ability to satisfy fully their fertility or contraceptive use goals. It is necessary to remember that these costs are influenced not only by the supply environment but also by political, socio-economic, cultural and individual factors. Thus, greater accessibility of services may, in one country, translate into more family planning use or demand, while in another it may not, if other factors affecting costs offset this gain.

The next important step is to distinguish among the resource inputs, organizational and operational elements, and key outputs at the 'organization' or 'program' level. Program evaluation requires viewing and understanding organized family planning interventions as a formal system of components. Traditional approaches to program

[2]Costs associated with fertility arise when childbearing is constrained by biological supply, economic factors, or community and social norms. They, for example, include need for children for old age support or child labour, **expenses** of children rearing, and the psychosocial rewards of and penalties from family size and child loss. Costs associated with family planning are psychosocial, physiological or market in nature, such as accessibility, affordability, provider preferences and contraceptive side effects.

evaluation (e.g., Rossi and Freeman 1989) often emphasize the performance aspects and focus on program processes. Figure 2 diagrams the main components of a family planning program[3] starting with societal/political governance factors and external development assistance. Larger societal and governance factors frame the nature of the country's politico-administrative system (Lapham and Simmons 1987). which in turn defines levels of political support, resource allocations, and legal codes and regulations relevant to family planning. Such inputs influence the organizational structure for family planning and its components, i.e.. service infrastructure, sectoral integration, delivery strategies and public-private sector involvement.[4] The organizational structure itself determines the implementation of key family planning operations-training, commodity acquisition and distribution; information-education-communication (IEC); management and supervision; and research and evaluation. These subsystems have been the focus of situation analyses (Fisher *et al.* 1992) which aim to measure, in the cross-section, the quantity and quality of the service environment and its operations.

To complete the full conceptualization of program dynamics, three principal outputs are viewed to result from service-related operations: (a) physical access to services. (2) quality of services and (3) a public image of the program and acceptability of its services. Physical access is, as defined by others (e.g.. Hermalin and Entwisle 1987), the existence and location of service points both in the public and private domains. Service quality, as an output[5], is the result of how the standards prescribed by the sponsoring program are executed and delivered by their staff at service points. The third output of image of the program and acceptability of its services is the result of the systematic promotion of the family planning concept and sponsored services through media and interpersonal outreach efforts. Conceptualizing and differentiating among the three outputs is an important theoretical underpinning of program evaluation. In principle, this suggests that outputs are quantifiable and measurable. This makes it possible to trace their subsequent and separate influences on individual-level adoption and practice, as well as the effects of their antecedents, i.e., program inputs.

Conventionally family planning inputs have been as a 'black box. often represented by one variable. The significance of Figure 2 lies in explicitly recognizing family planning inputs as part of a large-scale, organized and complex intervention. Figure 2 portrays family planning programs as intentional acts of social engineering, which, within their cultural contexts, are designed, shaped and constrained by varying levels

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[3] The model also applies to a country's level of effort in family planning in the absence of a formal program.

[4] Service infrastructure refers to the institutional personnel, facilities and equipment used to deliver family planning services to clients. Sectoral integration refers to the degree to which family planning services are delivered in conjunction with other public sectors' services (such as health or social security). Delivery strategies refer to the variety of approaches to delivering family planning information and supplies from traditional clinic-based systems to employer-based clinics, community-based distributors, and mobile teams. Last, public-private sector involvement refers to the degree to which service providers in both sectors are involved in a common mission to provide ready access to contraception.

[5] Quality of services is to be distinguished from quality of care. The former is a program-level output only while the latter involves client interaction and would be measured in the context of service utilization.

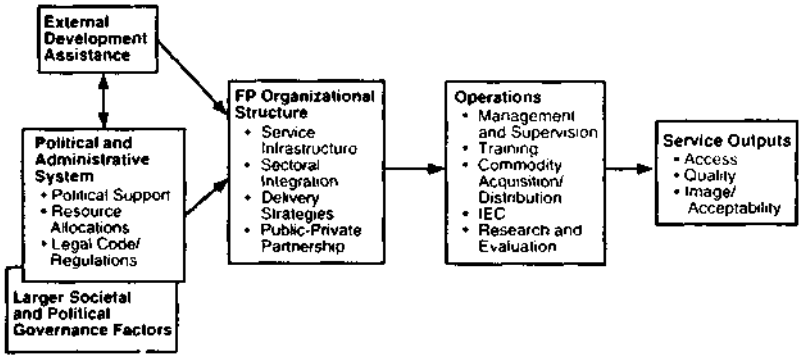

Fig. 2. Conceptual Framework of Family Planning Supply Environment

of political will, strategic planning, and service delivery resources. The programs are mandated to achieve particular goals and objectives and implement their charge by carrying out principal functions of outreach (information-education-communication), service delivery, training, contraceptive commodity acquisition and distribution, planning and management, and research and evaluation. By elaborating the causal connections between program components, the sociology of the family planning program can be studied with existing research methodologies and introduced into the behavioural models that have emphasized the individual-level determinants of demand.

Ambiguity regarding these program-population distinctions limits the validity and utility of evaluation results. Such ambiguity constrains how well the effects of training inputs, for example, on service quality, independent of other service inputs, can be understood. Most importantly, the conceptual framework is valuable for structural modelling. With a multi-level model and appropriate data, one can. for example, estimate the effect of political commitment, either by national leadership or formal population policy, directly on service accessibility and indirectly on contraceptive acceptance levels. One can also invesitgate whether the centrally-planned expansion or design of services, seen, for example, in the placement of clinics and community-based services, influences the overall profile of service availability and level of use among targeted populations. The theoretical and analytic utility of the framework will only be known through repeated empirical applications but offers the potential to reveal any hierarchical effects of social inventions from national policymaking through to regional and community implementation to family-level change in targeted behaviours. This type of effort is needed to reduce existing confusion over how program outcomes emerge and the types of actions and levels of efficiency that are indicated to achieve

them. As the interrelationships and linkages are researched and refined, they will also help identify gaps in other areas such as types of data systems, levels of analysis, and types of studies.

Technical Needs for Family Planning Evaluation Improvements

Future needs for improving family planning evaluation do not end with conceptually clarifying program and population linkages. There are also technical needs that relate to improving program-based data systems, developing linkages between program- and population-based data, institutionalizing measurement efforts, constructing indicators for program monitoring, and expanding the range of evaluation designs. These are discussed below.

Program-based Data Systems

A consequence of the conceptual neglect of family planning programs is the empirical neglect of program-based data systems and therefore the capacity to pursue linkages with population-based measurers. Historical reasons can be cited. Until the mid-1970s, when country programs were nascent efforts for the most part, program evaluation largely occurred at the imitative and with the support of donor organizations. Service statistics systems (SSS), involving mostly manual client and clinic record keeping, provided the basis for monitoring whether family planning was an acceptable innovation. Special population-based surveys (KAP) were conducted to gauge overall public opinion of and interest in family planning and to validate SSS-based measures of birth control practice. The major weaknesses of SSSs were perceived to be their labour-intensive nature, the wide margin for recording and reporting errors, and the long delays in producing cumulative statistics on program performance. These, in addition to their restricted coverage of program acceptors, meant that program evaluation did not address contraceptive patterns in the population as a whole in a timely and accurate manner. Support for these program information systems, while never very strong, nonetheless produced some significant efforts in the late 1960s and early 1970s as found in manual series produced at The University of Chicago (e.g., Bogue 1970), Columbia University (e.g., Reynolds 1970) and The Population Council (e.g. Ross *et al.* 1969).

Since the 1970s, a major shift away from program-based to population-based data systems, primarily towards periodic sample surveys, has taken place. The emergence of programs like the World Fertility Surveys (WFS), Contraceptive Prevalence Surveys (CPS), and Demographic and Health Surveys (DHS), principally developed and funded by A.I.D., reflects the near wholesale replacement of data from local systems—programs, censuses, and vital registration—to data from national, probability sample surveys of households for family planning evaluation.

What have been the data costs of this shift insofar as program evaluation needs are concerned? The most obvious losses concern the quality, scope and institutionalization of program measurement (Palmore and Palmore 1990) and specifically the lack of direct measures of service utilization. In the predominant group of countries where program information .systems are still weak (Keller 1991), information about program

services must be compiled through national household surveys, either from (1) community or cluster-level supplemental modules or (2) respondent perceptions. The latter are however a biased and unreliable source since, in addition to recall bias. individual perceptions and reports are tempered by differential awareness of and demand for family planning services. For example, persons who have no knowledge of family planning are unable to report the existence of these services, while those with high levels of knowledge may overstate service accessibility.

The experience with community-level surveys, on the other hand, has also not been smooth or fully satisfactory. In principle, these surveys can provide useful and reliable data on public and private family planning services, if properly designed and fielded. As their role has evolved in survey programs like the WFS and DHS, community surveys have been a stepchild to the main household surveys component and have struggled to establish their credibility. Under WFS-sponsored efforts, a number of insights into the community contexts, particularly their economic and public infrastructures, were gained (e.g., Casterline 1985). The present efforts under the DHS can still be exploited to tap their potential for program evaluation.

One promising design change is to develop a facility-based survey or census, wherein a national (and not just rural) inventory of services can be taken.[6] If the geographic or administrative ecology of services is comprehensively measured for small enough units (e.g. townships or villages), these records can be linked with household survey data to study program-population linkages. Alternatively, the present DHS service availability module (SAM) can be modified to expand its coverage of facilities. services, and other program activities in sample clusters. All facilities, irrespective of type or location, would be visited and their services and activities inventoried. This cluster-based environment should be evaluated for its contextual effect on household respondents' behaviors, as is now done; but it could also be evaluated for its approximation of the actual distribution of services. It would also enable better modeling of factors affecting method and provider choice.

Program-population Linkages

Greater linkage of program-based data with or comparison to program and administrative records than now occurs should be encouraged to promote their mutual strengthening as measures of the service environment and use for program evaluation. Program data have in the past been used to verify survey-generated measures of service availability (Srikantan 1982). Indonesian service statistics have been integrated with national and DHS surveys for this purpose (Lerman, *et al.* 1989). Their linkages enable evaluators to assess the supply-demand interactions that constrain or enhance use of program contraceptive methods.

Linkage of program with population-level data is standard in evaluations of domestic

[6] This is being initiated through situation analyses (Fisher *et al.* 1992), but the experience to date is limited to one Latin American and ten Sub-Saharan African cases

(U.S.) welfare programs, such as Social Security, Women, Infants and Children (WIC), and Medicaid. Individual records for clients of these programs have been linked sequentially over time or merged with other population or service data for evaluation purposes (e.g., Buescher *et at.* 1991). In speculating about their potential for family planning program evaluation in the developing world (under conditions assuring the confidentiality of individual responses), local clinic records on services extended to clients could be linked with these clients' other public records (e.g.. from surveys, registries, or programs). Vital registration data on births or deaths for an aggregate cohort could be linked with family planning clinic data. for instance, if a study of the latter's effects on birth weight or infant mortality was desired." The advent of microcomputer hardware and software, increasingly both powerful and inexpensive, provides a technological resource that was not available earlier and should be fully exploited for the development of information systems in developing country family planning programs.

Institutionalization

Ideally, measurement of program effort at the service deliver}' level should not have to depend on periodic community-level surveys attached to national sample surveys but instead should use data from institutionalized, fully computerized program information systems that regularly monitor events, labour and costs for program subprocesses. These systems should be maintained by public and private family planning programs. Donor organizations that track their resource allocations and activities by country project through management information systems (MIS) can expand their overall evaluation potential by integrating and linking their data with those of country-based data systems. This can provide the capability to examine the relative impact of country program versus donor inputs.

The present tendency to obtain data on population-based and (imperfect) program-related information through externally-assisted, periodic national surveys has deterred exploring how ongoing national data systems, such as household surveys and vital registration, might incorporate the subject matter. A limited set of questions on family planning could be included, allowing more frequent feedback to programs than the four to five year intervals that separate periodic surveys like the DHS. For example, the Government of Nigeria's Federal Office of Statistics conducts a General Household Survey quarterly of some 6.000 households (Federal Office of Statistics 1992). This survey has recently incorporated a family planning module of questions to provide quarterly and annual statistics. Similarly, the Government of India's Central Statistical Office maintains a sample registration system (Registrar General 1988), as well as regularly fields a national sample survey, both of which provide potential vehicles for systematic monitoring of family planning and fertility behaviours. For the global community the selective collection of government resource inputs for family planning within the biannual U.N. Population Inquiry exercise (e.g.. United Nations 1990) is another resource to be considered.

The challenge ahead will be to explore the institutionalization of systematic pro-

[7] This study design would need to address the effects of use of non-clinic source of family planning service as well.

gram-based and population-based measurement for family planning evaluation as a means for securing long-term evaluation capability. This institutionalization should not be seen as a unique action, since such capabilities exist in other fields, such as agriculture, industry, health and labour. The primary challenge will be securing local and international support for developing such permanent information systems.

Indicators and Program Monitoring

Adequate data systems can greatly expand the potential of family planning program evaluation in directions that improve the efficiency of programs and broaden the depth and scope of their assessments. A well-developed conceptual framework can supply key components that can be operationalized as a system of indicators, relevant at both the program and population levels. The value of each indicator can be tracked over time to monitor program performance and can be function-specific, as when training or service output indicators are desired, or outcome-specific, as when contraceptive prevalence levels or fertility intentions are monitored.

Indicators of effort are perhaps best known through the work of Lapham and Mauldin (1972), Lapham and Mauldin (1984), and Mauldin and Ross (1991). wherein change in country-level indicators over time and across regions suggest considerable achievement in family planning performance. There is recent interest in further defining such indicators for family planning program inputs/processes/outputs within functions and population-level outcomes to enable more consistent and standardized applications (e.g., Bertrand *et al.* forthcoming). Such efforts may be especially useful in settings where family planning interventions are diverse and widely sponsored. The development of standardized indicators parallels work in developed countries (e.g.. Kar 1989) where selected indicators are used to monitor child health (Miller *et al.* 1989). Similarly, prenatal care evaluation prompted the construction of the Kessner Index (Kessner *et al.* 1973). which is widely used (e.g., Singh *et al.* 1989) to measure prenatal care adequacy in terms of the number of visits and timing of initiation,

For the not-so-distant future, the establishment of a system of leading indicators of program performance and impact might be adopted as a goal. whereby the production and consumption of program services and fertility outcomes, such as intentions and birth rates, are traced annually. Research will be necessary to establish both the structural relationships among indicators as well as the time lag patterns behind their trend relationships. However, with a capability' to anticipate trends in program and population behaviours, family planning evaluation science can be brought closer to the level enjoyed in macroeconomics.

One approach to framing an indicator system useful for tracking program resources and performance in developing country settings is to apply conventional evaluation paradigms to family planning, building upon a classification system used by Reynolds (1990) and the program components conceptualized earlier, as shown in Figure 3. This system conceptually distinguishes the inputs of program structure from the process and outputs, both for family planning organizations at the national level and at the level of external donor organizations. Figure 3 distinguishes between program-level supply

Donor Organization			*Country Program*			*Population*	
Inputs	*Process*	*Outputs*	*Inputs*	*Process*	*Outputs*	*Effects*	*Impact*
• Goal definition • Strategic planning • Resource allocations	• Sectoral Imple-mentation	• Country projects (designed & Funded)	• Local program[a] inputs • Goal definition • Strategic planning • Resource allocations • Donor project inputs	• FP program development • Coordination of inputs	• Service profile[b] • Service provision	• Contraceptive use • Contraceptive demand • Family size norms	• Fertility change • Other MCH improvements • Other development improvements
Types of Indicators							
• Funding levels • Staffing patterns • Strategy monitoring • Goal-specific indicators • Donor coordination	• Country Planning/ strategy review	• Launch dates and other timing markers • Action programs with budgets	• Number and type of projects and programs • Budgets • Goal orientations • Political commitment	• Policy • Service delivery • Commodities/ logistics • Management • Training • IEC • Research & evaluation	• Access • Quality • Image promotion • Delivery (CYPs, acceptors) • Sustainable projects & programs	• Prevalence level • Use effectiveness • User competence • Unmet need • FP knowledge • Intentions to use FP • Attitudes toward FP methods	• Fertility level • MCH outcomes • Development outcomes

[a] Public and private; [b] Access, quality and image.

Fig. 3. Schematic of External Donor and Country Program Inputs/Process/Outputs and Population Impacts and Illustrative Indicators

variables and population-based effects and impacts, where effects are more immediate outcomes of program exposure, such as contraceptive demand and use. and impacts are long-term outcomes, such as fertility change. In this schematic, one can trace the pathways by which donor organization inputs[8] in the form of bilateral projects at the country level conjoin local program and other donor inputs and are used to support family planning program operations. Specific indicators should be put in place to monitor changes in the implementation of such components as policy support, contraceptive commodities training. I-E-C. planning and management, and service delivery. Two types of program output categories to be monitored are then: (1) the service profile, in terms of access, quality and image of services, and (2) service provision (utilization), in terms of the volume and mix of services delivered. The immediate effects from program operations can be monitored by indicators of contraceptive demand and use and fertility intentions. Subsequent outcomes or potential impacts can be monitored by fertility indicators, as well as indicators of health or welfare improvements.

It is important to keep in mind that fertility regulation demand, as generated by non-program factors, is an implicit part of the context within which programs operate. The purpose of Figure 3 is to suggest areas for program-oriented indicator development but it risks over-representing the service supply effects.

Evaluation Design

For historic and academic reasons, family planning program evaluation research has developed a unique demographic character. Rather than focusing on program factors, the past emphasis in family planning evaluation has been on a decomposition of the reproductive process and assessing the reductions in a woman's natural fertility due to the intermediate variables (Davis and Blake 1956). Contraceptive protection has figured importantly in these calculations, and its effect has generally been attributed to the practice of modern birth control methods made available by organized programs. The gain of a well-grounded empiricization of the fertility regimen, on the one hand, however, comes at the expense of the absence of an equally well-grounded, empirically-based model of the family planning supply environment. While the relative efficiencies and effectiveness of lactation, waiting time to conception, gestation, contraception and other components of a woman's fertility are relatively well understood. the effects of family planning I-E-C, training, policy, or service systems on service utilization on contraceptive practice, by comparison, are not.

This is to be contrasted with the orientation and content of program evaluations and types of designs used in domestic efforts. Evaluations in fields such as labour, education, and health draw closer connections than family planning ones between program components, processes and implementation and intended behavioural outcomes. For example, recent attention to the role of prenatal health care on birth outcomes, such as low birth weight or neonatal mortality, has produced a number of

[8] It is important to note that the spatial prominence given donor organizations in Figure 3 is not suggestive of equivalent causal impact.

evaluations of specific services delivered during pregnancy. Home-based outreach programs by maternity care coordinators that secure the use of prenatal services by pregnant women have been found to improve birth outcomes (Buescher *et al.* 1991). Surveillance systems that track high-risk pregnancies are used to evaluate the impact of targeted interventions of infant mortality. Siegel *et al.* (1986) examine the effectiveness of transporting mothers at risk to a hospital network equipped with neonatal intensive care units for reducing neonatal mortality. Although demographically oriented evaluations arguably may employ stronger methodologies, the point to be made is that greater attention to program dynamics in family planning models is in order.

The same specificity in and quality of information about developed country family planning services is unfortunately not available in most less developed country (LDC) settings. Primarily through operations research on family planning programs (e.g., Phillips *et al.* 1988), more is being learned about LDC program strategies and their immediate effects; but an overview of the major lessons learned is still needed. It could be said that the state of LDC family planning evaluation has been an outgrowth of survey-based behavioural research on the individual, rather than programmatic, determinants of contraception.

A range of methods for measuring the demographic impact of family planning programs is available—standardization, trend analysis, standard CYP, reproductive process analysis, component projection, prevalence models, experimental design, and multivariate areal analysis (Sherris 1985; Hermalin 1982). These methods vary in terms of the questions they address, data requirements, underlying assumptions, and precision of answers with respect to substitution effects. A recent impact assessment (Bongaarts *et al.* 1990) applies a form of component projection. The Matlab demonstration project (Phillips *et al.* 1982) approximates an experimental design, as much as a large social experiment can without the random allocation of subject to treatment and control areas.

As the structural complexity of family planning programs increases, however, a broader range of evaluation designs is needed to address a broader array of evaluation issues. The focus of these issues is likely to be increasingly performance-based. Resource constraints will figure significantly in defining the types of evaluations needed. Timeliness in feeding program evaluation results back to planners and managers also suggest the application of more focused techniques, such as rapid assessment (e.g., Askew *et al.* 1993). Lot sampling procedures used for quality assurance in production have been applied to determine the 'level of health' defective conditions in a population and are appropriate for evaluating family planning needs (e.g.. Rosero-Bixby 1990). Given the advantages of present microcomputer capabilities, geographic mapping procedures are worth investigating as a means for determining population-facility coverage and directly addressing program planning (e.g.. Rosero-Bixby 1993). Meta-analyses (Cook *et al.* 1992) of relevant study findings will also strengthen the empirical base for policy decisions and is a technique immediately applicable to high-quality operations research findings.

A simple improvement to data collection that can add considerable strength to quantitative evaluations of program-behaviour linkages is the increased use of panels in sample surveys. Repeated measurement over time both of the original sample of facilities in clusters and of eligible individuals in households can provide considerable statistical power in assessing fixed and variable effects (Markus 1979) of program and individual determinants of contraceptive and fertility outcomes. Variable effects can indicate whether measured 'change' in a factor such as services availability is responsible for any part of an observed 'change' in contraceptive use for a given sample. Linear analysis of change has not been explored adequately with survey data, although initiatives of this type are being independently pursued elsewhere (DaVanzo *et al.* 1991). Given the lagged nature of program effects, it is important to incorporate panel data collection into large-scale survey programs. With over 200 household sample surveys fielded since 1970 through cross-national survey programs, it is remarkable that a negligible number have involved panels.

Stronger promotion of the classic experiemental design is also warranted under a new phase of impact evaluation. The gold standard of a double-blind, randomized experiment has been difficult to secure in evaluation because programmatic interests tend to intervene in the design and implementation stages. However, because the obstacles are largely programmatic, by implication the solution is also programmatic. Sufficient political will and support for an experiment is needed to protect the integrity of its application. The inherent clarity and easy interpretability of experimental results suggests that this particular design deserves more frequent adoption in the future than has occurred.

Multi-level analysis of structural models incorporating family planning program factors are found frequently in studies examining the role of contraceptive service availability (Entwisle *et al.* 1984: Cochrane and Guilkey 1991: Tsui and Ochoa 1992). It is an analytical model eminently suited to the impact question because of its ability to address theoretical questions regarding social impacts from two. and may be more social systems. At the same time some important methodological issues arise for the estimation of the models, particularly for estimating correctly the standard errors for the effects of higher-level factors on lower-level outcomes to avoid inappropriate inferences (Pullum 1991 Guilkey 1991).

Multi-level analysis with longtudinal data (e.g.. Frankenberg 1993) offers a promising additional option as well because it more closely approximates an experimental design, if the intervention to be evaluated[9] can be conducted between panels and data at both program and population levels are gathered. The effects of changes in service-level determinants on changes in service outputs can be examined separately from the effects of changes in individual factors. This should be of particular interest to evaluators since most family planning interventions target changes in the service

[9]The intervention may involve a nominal shift in design of service delivery, e.g., the addition of private providers for family planning, or a major restructuring of operations, e.g., the integration of family planning into all MCH care.

environment. Where no effects are found within adequate lag times, one would not expect to find any impact on individual behaviours. Similarly, changes in both program- and population-level factors can be examined jointly for impacts on individual behavioural change. To the extent that the measured change bounds the implementation of actual 'treatments' to the nature and character of services being evaluated, the estimated net effects of program and individual factors will be of considerable interest. For example, the effect of changes in fertility demand, which are a function of improved socio-economic status, can be compared with the effect of changes in service delivery in explaining observed contraceptive or fertility change. In this manner, a structural panel model can be adopted to address the key question of interest, i.e., what is the impact of family planning programs.[10]

Building a 'Transcontinental Highway'

Figure 3 lends itself to a metaphor of building a transcontinental highway. Building this highway will involve major construction in the form of program-based data systems, mobilization of advanced equipment to computerize the systems, and innovative engineering plans for their analysis and structural connections. Its path would take one from any point on the highway to another but, more importantly, the full program evaluation process would ensure that the significant points of substance, or 'cities', would be linked. Obviously, the construction effort is not a trivial undertaking; and the weight of recent experience has been restricted to the survey-related materials, financing, and engineering plans favoured by its architects.

The expansion of current perspectives on family planning program evaluation, more closely oriented to its dynamics, calls for new thinking and analytic strategies that may not be immediately obvious. In some cases, the unit of analysis may be program areas. service events or processes: in other cases, it may be the individual, whether a service client or not. The highway of program evaluation offers many 'windows' for process and impact studies. It is possible for process evaluations on the left side of the figure to focus on relationships among various elements that may serve alternately and sequentially as independent and dependent variables (as long as the correct temporality of causation is preserved). Thus, while frequency of selected country program events may be an outcome of interest for one process evaluation (e.g.. assessing donor assistance effects on I-E-C activity levels), it may subsequently be an input for another (e.g., the effects of I-E-C activity on population perceptions of services).

Measurement of these input/process/output elements can be in terms of production costs or effort and expressed in per capita or time units. The amount of first-hand experience on appropriate metrics for measurement, however, is relatively dated and modest; and the mechanics of defining the. proper building blocks for measurement lie ahead as major challenges. The pay-off, so to speak, is to improve knowledge about the role of family planning cost-effectiveness and impact of resource allocations. These

[10]This does not eliminate the need to test the reduced-form model also, whereby the magnitude and strength of the simple causal relationship, i.e., between the program variable and the individual behavioural outcome, is

are important aspects of evaluation, particularly for the future. As a result of limited resources, evaluation interest will and should be shifting from the issue of whether programs have an impact to understanding which components have the largest impact per dollar (or other currency unit) spent. For example, attention should focus on whether a community-based distribution or contraceptive social marketing program sufficiently increases use to justify its cost. A similar cost-effectiveness question concerns the relative importance of investments in training, I.E.C. management or research.

There is acknowledged uncertainty over how well Figure 3 can be modelled and empirically studied. Figure 3 calls for multiple levels of measures and its parametri-zation could present intractable problems for estimation. More complex structures for multi-level models may be necessary, while their computational difficulties are simultaneously explored. Multi-level analyses, for the most part. would be based on individuals as units of analysis, representing an effort to push from the right side of Figure 3 towards the left to capture program intervention effects. Operations research, on the other hand, offers another evaluative strategy that would approach these connections from the program perspectives on the left side and move toward the population effects on the right.

In addition, feedback effects will also need to be addressed. For example, individual, or even community leader, demand for family planning may directly influence the geographic placement of clinics. As a natural outgrowth of evaluation, the return of information to planning nodes in a program system can introduce recurring influences that may not be easily captured in a static framework.

The strategies posed here invite a new round of initiatives on family planning program evaluation. They are leveled at an ambitious scale, not unlike building a transcontinental highway. While the feasibility of their achievement has yet to be determined, the significance of accomplishing this full engineering feat will not be just its construction and subsequent transport capability but also the identification of strategically important 'cities' where the highway segments meet. It is not necessary to wait for full linkage between all cities in constructing the highway, since evaluation activity around the hubs, such as 'provider-user' relations, will be helpful in the interim.

Concluding Comments

This paper has provided a historical perspective on the evolution of family planning programs and efforts to evaluate their demographic effects over the past three decades. For a number of years, the population field has wrestled with its understanding of the relative benefits and costs of social engineering and social change. As a major international movement, family planning has gained political stature and has integrated its service thrust with basic health care provision in most developing countries. A measure of that success may be the growing concern that future available resources will not meet the imminent levels of demand. Among the large donor agencies, deliberate efforts are being made to shift an increasing share of the financial responsibility for and

costs of family planning program support to local governments, the private sectors and clients in these countries. The old and persisting question of the impact of family planning programs needs a fresh re-examination with more attention placed now on how well the effects and impacts can be known and with what data indicators, and evaluation designs.

This paper has called for greater strategic thinking on family planning program evaluation and proposed a number of new initiatives that hold considerable promise. They involve strengthening the conceptualization of program effects and population-level behavioural responses, reinforcing the different data systems by which performance and impact markers can be monitored, and encouraging the innovative selection and use of evaluation strategies or designs. Further behavioural research on family planning impact will also be needed to address issues of growing programmatic significance. There are concerns about the immediate effects of services on such issues as low contraceptive use effectiveness resulting from early discontinuation, quality of client-provider interactions, serial use and switching of contraceptive methods, and persistent psychosocial costs and benefits of services that keep unmet need at high levels.

There should be an effort to explore the evaluation potential of a number of extant sources of data-comparative national surveys of households and facilities in their immediate surroundings, governmental inquiries on population policy, and operation research findings. However, the gap between what data may be needed for widely scoped program evaluations and what are actually available will still be large. Hence, modifying current and experimenting with new measurements and methodologies, like surveillance and geographic information systems, are likely to help advance family planning program evaluation capabilities significantly. If one views the scientific challenges ahead along the lines of the 'transcontinental highway' metaphor described above, the undertaking could ultimately signify a major engineering accomplishment. The path of any journey on this highway, insofar as family planning program evaluation is concerned, will hopefully not only mean access to and connections between all the important 'cities' but arrival at the targeted destination within budget.

References

Askew, I.. Tapsoba P., Ouedago Y..Viadro C.. Buhonan D. and Sebago. P.. 1993, Quality of care in a family planning program: A rapid assessment in Burkina Faso. *Health Policy and Planning* 8(1): 19-32 Berelson, B.. Anderson, R., Harkavy, 0.. Maier. J., Mauldin. W. P. and Segal., S.. 1966, *Family Planning and Population Programs: A Review of World Developments.* Chicago: The University of Chicago Press. Bertrand, J., Magnani, R. and Knowles, J. (in press). *Handbook of Indicators for Family Planning Program Evaluation*. Chapel Hill, North Carolina: Carolina Population Centre. The EVALUATION Project. Bogue, D.. 1970, Family planning improvement through evaluation. *Rapid Feedback for Family Planning Improvement Manual.* Number 1. Chicago: University of Chicago, Community and Family Study Center. Bongaarts, J.. 1986, The Prevalence Method. In: *Manual IX Addendum: The Methodology of Measuring the Impact of Family Planning Programmes on Fertility*, PP. 9-14. New York: United Nations. Bongaarts, J., Mauldin,W. P. and Phillips, J., 1990 , The demographic impact of family planning programs. *Studies in Family Planning* **21** (6): 299-310.

Buescher. P.. Roth. M.. Williams. D. and Golbrth. C.. 1991. An evaluation of the impact of malemilv care coordination on medicaid birth outcomes in North Carolina. *American Journal of Public Health* **81;** 1625-1629. Bulatao. R.. 1993. *Effective l-'umily Planning Programs.* Population. Health and Nutrition. The World Bank. **Washigton. D.C. Casterline.** J. (ed.). 19X5. *The Collection anil Analysis of Community Data.* **Voorburg, Netherlands:** Inlemationa] Statistical Institute Cochrane. S. and Ouilkey. D.. 1991. The Effects of Access on Contraceptive Use in Tunisia: Tracing the Effects of Social Services on Contraceptive I'sc. World Bank (mimeo.) Cleland. J.. 1990. The Adequacy of Service Statistics Systems for Program Monitoring, Evaluation and Research. In ; *Monitoring and l-.valualing Family Planning Programmes in the 1990s,* pp. 75-85, United Nations. Economic and Social Commission for Asia and the Pacific. Cleland. J. and Wilson. C.. 1987. Demand therories of fertility transition: An iconoclastic review. *Population StmJies* **41:** 5-30. Cook. T.. Cooper. H. and Cordroy. D. (eds.). 1992. *Meta-analysis for Explanation.* New York: Russell Sage Foundation. DaVanzo. J.. Haaga J.. Pcterson C. and Peng. 'I'. N.. 1991. Tweleve Year Follow-Up in a Panel Survey in Malaysia. Paper presented at the 1991 .\nnual Meeting of the Population Association of America. Washington. D.C.. March. Davis. K. and Blake. J.. 1956. Social structure and fertility: An analytic framework. *Economic Development and Cultural Change 4:* 211-235. Entwisle, B., Hermalin. A.. Kamnuansilpa, P. and Chratrithorong, *A.*. 1984, A multilevel mode) of family planning availability and contraceptive use in Thailand. *Democracy* **21** (4): 559-574. Federal Office of Statistics. Nigeria. 1992, *National Integrated Survey of Household.* Preliminary Report of General Household Survey, April 1991-March 1992. Lagos: Federal Office of Statistics. December. Fisher. A-. Mensch. B.. Miller R.. Askew. 1.. Jain. A., Nedit C.. Ndhlovu. C. and Tapsoba. P, 1992. *Guidelines and Instruments for a Family Planning Situation Analysis Study.* New York: Population Council. Frankenberg, E., 1993, The Effect of Access **to** Heahh Care on Mortality: An Analysis of Infant Mortality Trends in Indonesia 1980-1987. *Unpublished.* Gillespie. D., Cross, H.. Crowley. J. and Radloff. S.. 1989. Financing the Delivery of Contraceptives: The Challenge of the Next Twenty Years. *In:* S. Segal *et al.* (eds,). *Demographic and Programmatic Consequences of Contraceptive Innovations,* pp. 265-295. New York: Plenum Press. Guilkey. D.. 1991. Correcting for Unobserved Community Effects in Demographic and Health Survey Data. Carolina Population Center (mimeo'). Hermalin, A-, 1979, Multivariate Areal Analysis. *In:* United Nations, *Methods for Measuring the Impact of Family Planning Programmes on Fertility: Manual IX,* pp. 97-111. New York: United Nations. ____ , 1982, Family Planning Programs. Effects on Fertility. *In: 1.* Ross (ed.). *International Encyclopedia of Population.* Volume 1. pp. 228-235. New York: Free Press. _ _ 1983. Fertility Regulation and its Costs: A Critical Essay. *In:* R. Bulatao and R. Lee (eds.). *Determinants of Fertility in Developing Countries.* Vol. 2, pp. 1-53 New York: Academic Press. Hermalin, A. and Entwisle, B., 1982. Surveys and Their Use in Family Planning Analysis. *In A.* Hermalin and B. Entwisle (eds.). *The Role of Surveys in the Analysis of Family Planning Programs,* pp. 3-20. Liege: Ordina.. __and __,1987. The Availability and Accessibility of Contraceptive Services. *In:* R. Lapham and G. Simmons (eds.). *Organizing for Effective Family Planning Programs,* pp. 583-596. Washington, D.C.: National Academy Press. Kar, S. B. (ed.). 1989, *Health Promotion Indicators and Actions.* New-York: Springer Publishing Company. Keller, A., 1991, Management information systems in maternal and child health family planning programs: A multi-country analysis. *Studies in Family Planning* 22(1): 19.30. **Kessner. D.** *et al.*. 1973, *Infant Death: An Analysis by Maternal Risk and Health Care.* **Institute of Medicine,** National Academy of Sciences. Washigton, D.C. Knodel, J. and Wongsith, M., 1991. Family size and children's education in Thailand: Evidence from a national sample. *Demography* **28** (1): 119-131.

Lapham. R. and Mauldin. W. P.. 1972. National Family Planning Programs: Review and evaluation *Studies in Family. Planning* 3 (3): 31-34. _____ and ____ . 1984. Family planning program effort and birthrate decline in developing countries. *International Family Planning Perspectives* **10** (4): 109-118. Lapham, R. and Simmons. G. (eds). 1987. *Organizing for Effective Family Planning Programs.* Washington. D.C.: National Academy Press. Lerman, C.. Molyneaux. J.. Moeljodihardjo, S. and Pandjailan. S.. 1989. The correlation between family planning program inputs and contraceptive use in Indonesia. *Studies in Family Planning* **20** (I): 26-37. Markus. G. B., 1979. *Analyzing Panel Data.* Beverly Hills. CA: Sage Publications. Mauldin. W. P.. 1989, Fertility Projection/Trend Analysis. *In:* United Nations. *Methods for Measuring the Impact of Family Planning Programmes on Fertility: Manual* IX. p. 149. New Work: United Nations. _____ 1991, Contraceptive Use in the Year 2000. *In: Demographic and Health Surveys World Conference, Proceedings,* Volume, II. pp. 1373-1394. Columbia. MD: IRD'Macro International. Mauldin. W. P. and Ross. J.. 1991. Family planning programs: Efforts and results 1982-89. *Studies in Family Planning* **22** (6): 350-367. Miller. C. A.. Fine, A. and Adams-Taylor. S.. 1989. *Monitoring Children's Health: Key Indicators.* 2nd **edition.** Washington. D.C.: American Public Health Association.

Ory. H. W.. 1982. The noncontraceptive health benefits from oral contraceptive use. *Family Planning Perspectives* **14:** 182-184. Palmore, *].* and . Palmore. .1. I. K.. 1990. Population Management Information Systems in the 1990s: Evolution. Revolution or Recycling? *In: Monitoring and Evaluating Family Planning Programmes In the 1990s,* pp. 63-73. United Nations. Economic and Social Commission for Asia and the Pacific. Phillips. J. and Ross, J.. 1992. *Family Planning Programs and Fertility.* London: Oxford University Press. Phillips. J., Simmons. R.. Koenig. M and Chakraborty. J.. 1988. Determinants or reproductive change in a traditional society: Evidence from Matlab. Bangladesh.. *Studies in Family Planning* **19** (6): 313-334. Pullum, T., 1991. Community Level Data Collection and Analysis. *In: Demographic and Health Sun'eys World Conference. Proceedings.* Volume II. pp. 807-826. Columbia. MD: IRD/Macro International. Registrar General. India. 1988. *Sample Registration System.* New Delhi Ministry of Home Affairs. Reynolds, J.. 1970. A Framework for the Design of Family Planning Program Evaluation Systems. *In: Manuals for Evaluation of Family Planning am/Population Programs.* No. 2 . International Institute for the Study of Human Reproduction. _____. 1990. Evaluation of Child Survival Programs. *In:* H. Wallace and K. Giri (eds.). *Health Care of Women and Children in Developing Countries,* pp. 154-164. Oakland. CA: Third Party Publishing. Rosero-Bixby. L., 1990. Monitoring a primary health care program with lot quality assurance sampling: Costa Rica. 1987. *Health Policy and Planning* 5 (I): 30-39.

_____. 1993. Physical Accessibility to Health Facilities in Costa Rica. *In: International Population Conference, Montreal,* Volume 1. pp. 185-190. Liege, Belgium: International Union for the Scientific Study of **Population. Ross, .1.. Stephan.** F. **and** Watson, W., 1969. *A Handbook for Service Statistics in Family Planning Programs.* New York: The Population Council. Rossi, P. and Freeman, H.. 1989, *Evaluation: A Systematic Approach.* Newbury Park. CA: Sage Publication. Sherris. J.. 1985. The Impact of Family Planning Programs on Fertility. *Population Reports.* Series J.. Number 24. Baltimore. MD: The Johns Hopkins University Population Information Program. Siegel. E.. Gillings. D.. Campbell. S. and Guild P.. 1986. A controlled evaluation of rural regional prenatal care. *Pediatrics* 77: 187-194. Simmons, G. and Simmons. R., 1987. The Task Environment of Family Planning *In:* R. Lapham and G. Simmons (eds.) , *Organizing for Effective Family Planning Programs,* **pp.** 57-58. **Washington. D.C:** National Academy Press. Simmons, R. and Phillips, J., 1990, The Proximate Operational Determinants of Fertility Regulation Behavior. *Research Division Working Papers,* No. 15. New York.: The Population Council. Singh. S.. Forrest, J. and . Torres, A., 1989, *Prenatal Care in the United States: A State and Country Inventory.* New York: Alan Guttmacher Institute.

Srikantan. K.. 1982. Quality and Comparability of Family Planning Data from Surveys and Service Statistics.
In'. A. Hennalin and B. Entwisle (eds.). *The Role of Sun'eys in the Analysis of Family Planning Programs.*
pp. 131-148 Liege: Ordina Editions. Tsui. A. and Ochoa. L.. 1992. Service Proximity as a Determinant of Contraceptive Behavior: Evidence from Cross-National Studies of Survey Data. *In:* .1. Phillips and .1. Ross (eds.). *Family Planning Programs and*
Fertility, pp. 222-256. London: Oxford University Press. United Nations. 1979. Methodology of Measuring the Impact of Family Planning Programs on Fertility.
Manual 9. *Population Studies* No. 66. ST ESA'SER.A/66. New York: United Nations. _ _ __ . 1990. *Result of the Sixth Population Inquiry among Governments.* Population Policy Paper No. 31.
ST/ESA'SER.R-104. New York: United Nations. __ _ . 1991, *Measuring the Dynamics of Contraceptive l-'se.* Department of International Lconomic and
Social Affairs. ST ESA'SER. R'106. New York: United Nations. Well. H. B.. 1979. Principles of Experimental Design, ,'n: *Manual IX: Methodology ol Measuring the Impact*
of Family Planning Programs on Fertility, pp. 126-141. Population Studies No. 66. ST ESASER. A. 66.
New York: United Nations.