POPULATION POLICY IMPLEMENTATION AND EVALUATION IN LESS INDUSTRIALIZED COUNTRIES.**

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Abstract : This research emphasizes impact of family planning programs on fertility under socioeconomic conditions of less industrialized countries. The findings of the study indicate that female literacy and program effort tend to explain variation of fertility across most regions and contraceptive prevalence levels.

Introduction

By the year 2000 as many as 600 million couples in the developing world may be using family planning methods *(Population Reports 1991).* This estimation is about 250 million more than in 1990. Obviously, there are increasing needs for family planning services in these less industrialized countries. Governments in these countries have to respond to these needs by promoting and providing more family planning services through family planning programs. Statistically, 95% of population in developing world lived in countries that provided some support of family planning programs and services in 1985 *(Bongaarts, Mauldin, and Phillips 1990).* Most of these countries have either official policy to reduce the population growth rate or official support of family planning activities for other than demographic reasons *(Nortman 1982).*

The success of family planning to lower population growth depends upon the quality of family planning program. More specifically, the quality of program

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can be judged on the basis of family planning program implementation and evaluation which are considered as ones of the most critical factors affected fertility decline. In addition, family planning program incorporates not only technology but also socioeconomic settings available for program implementation. Thus, the extent of success or failure of program is partly dependent upon social and economic conditions of the countries *(Srikantan 1977)*.

The most influential research on the contribution of family planning programs to fertility decline is one by Mauldin and Berelson *(1978)*. In their paper, they examine factors that correlate to fertility decline in 94 developing countries over the period 1965-1975. The main purpose of their paper is to determine the contribution of socioeconomic settings on fertility decline and the effect of population policies and programs over fertility decline. Mauldin and Berelson *(1978)* concluded that the socioeconomic variables included in their analysis may either represent true causes of fertility decline or may just be surrogates for underlying causal forces *(Mauldin and Berelson 1978)*.

Based on Mauldin and Berelson's framework, Lapham and Mauldin *(1972)* constructed an index of family program effort to measure the family planning program implementation and evaluation. The fifteen index constructed in 1972 was revised and expanded to 30 item-index in 1978 *(Lapham and Mauldin 1985b)*. They have used these 30 item-index to measure program effort in 100 less developed countries *(LDCs)* in 1982 and 1989. The program effort index consists of four major components: policy stage setting, services and service related activities, record keeping and evaluation, and availability and accessibility of family planning services.

To Lapham and Mauldin, family planning programs are carried out within a variety of social and economic contexts, and their effects coincide with those that influence contraceptive use and fertility. Their conceptual framework is based on the earlier work by Freedman *(1975)*, Easterlin *(1978)*, and the Panel on Fertility Determinants, National Academy of Sciences *(Bulatao and Lee 1983)*.

According to Lapham and Mauldin, program effort composed of three groups of activities inside the program, and the availability and accessibility of fertility control supplies and services which are outside the program. The three components of activities inside the program are policies resources and stage setting activities; service and service-related activities; and statistical record keeping, evaluation, and management's use of evaluation findings. These three inside activities taken together affect the availability and accessibility of fertility-control supplies and services

which lead to contraceptive prevalence and fertility decline. In addition, socioeconomic settings affect contraceptive prevalence directly and indirectly through the program effort. Moreover, this socioeconomic settings also affect fertility through the influence of demand and supply on motivation to accept and use fertility regulation. Thus, Lapham and Mauldin *(1985a)* have applied this conceptual framework to study family planning program effort in 1983 in 93 countries. The result of their analysis indicates that socioeconomic setting is strongly associated with contraceptive prevalence. Further, family planning program effort also strengthens such relationship. Thus, the combination of improved socioeconomic condition and greater program effort tends to bring the strongest association *(Lapham and Mauldin 1985a)*.

Statement of the Problem

Although many studies have tried to assess the impact of family planning programs on fertility under socioeconomic conditions of LDCs, however, none of these studies have compared the variation of these relationship across regions and/or across different contraceptive prevalence levels. Thus, this study attempts to explore these relationships. The problems of this study can be stated as follows:

1. What parts of program effort components affect total fertility rate when controlling for socioeconomic settings?

2. To what extent do program effort components and socioeconomic settings influence total fertility rate among different regions?

3. To what extent do program effort components and socioeconomic settings influence total fertility rate among different regions?

Literature Review

During the past three decades, there have been a significant number of studies on the determinants of fertility. These studies have been conducted at both macro and micro levels of analysis. The emphasis of this review is to present the major research findings at crossnational level on socioeconomic factors correspond to the studied variables of this research. This limited review of related research findings would show the influences of fertility determinants in socioeconomic settings of less developed countries *(LDCs)*.

Income

Rising incomes are expected to lead to increase in fertility *(Richards 1983)*. Higher income may associate with increases in the value of time, especially mother's time which may lead to lower fertility. The typical measurements of income are gross national product (GNP) per capita, gross domestic product (GDP) per capita, and personal income. Mauldin and Berelson *(1978)* find a positive relation between the level of GNP and fertility

decline. Tsui and Bogue *(1978)* find that estimated coefficient of income from regression analysis varies, depending on what other variables are included in the equation.

Urbanization

Urbanization leads to fertility decline because of higher costs of children in urban areas and changes in life styles *(Richards 1983)*. Urbanization also increases opportunities for work and education, particularly for women, leading to delayed marriage and increased costs of childbearing *(Tsui and Bogue 1978)*. Typical measures are percent of population living in urban areas, distance from the nearest city, and density. Tsui and Bogue *(1978)* find that the percent of urban population is negatively related to fertility in Africa and Latin America, but positively related to fertility in Asia. Cleland and Hobcraft *(1985)* find that the total fertility of rural residents, even after controlling for education and income, exceeds that of urban dwellers in all World Fertility Survey countries. Zhou *(1991)*, however, finds a negative association between urbanization and fertility in China.

Education

Increased education of adult population leads to fertility decline because of increased value of time and rising opportunity costs that come with increased education. In addition, education may lead to later marriage *(Richards 1983)*. General measures are male and female educational attainment, median education of adult population, and percent literate. Typically, female education tends to be more significantly associated with fertility decline. A negative association between female education and realized fertility is one of the most common findings of fertility research on many different societies *(Singh and Casterline 1985)*. Hermalin *(1978)* finds that female educational attainment is negatively related to total fertility rate. Entwisle and Winegarden *(1981)* find an inverse relationship between percent literate and fertility. The result of World Fertility Survey *(Cleland and Hobcraft 1985)* indicates that the average number of children per women declines as the woman's level of education increases. Recent study by Zhou *(1991)* also finds a strong negative association of educational level and fertility level in China.

In sum, the results of regression analysis of socioeconomic settings often reveal negative association with fertility. Certain indicators that consistently correlated with fertility are female literacy, GNP per capita or GDP per capita, and urbanization *(Birdsall 1977)*.

Recently, there is the attempt to include family planning programs to evaluate the contribution of family planning policy on fertility. Several

studies on family planning program and fertility *(Lapham and Mauldin 1985a, 1985b, Mauldin and Lapham 1987; Mauldin and Ross 1991)* indicate that family planning programs strengthen the association between socioeconomic variables and fertility. Lapham and Mauldin *(1985a)* have used the program effort index to study the impact of family planning program effort in 1983 in 93 countries. The result of the analysis indicated that socioeconomic setting was strongly associated with contraceptive prevalence. Further, family planning program effort also strengthened the relationship. Thus, the combination of improved socioeconomic condition and greater program effort tended to bring the strongest associations *(Lapham and Mauldin 1985a)*. Similar results are obtained in the analysis with crude birth rate as dependent variable *(Mauldin and Lapham 1987)*.

Bongaarts, Mauldin, and Phillips *(1990)* examine the determinants of fertility decline as measured by total fertility rate *(TFR)* of 1980-85 by undertaken a regression analysis based on two overall indicators: overall United Nation's development index and program effort index in 1982, and the interaction of program effort and development index. Regional variables of Africa and Latin America and total fertility rate in 1960-65 were included in the analysis to adjust the regional effect and prior fertility influence. The research finding indicates that the joint effect of development and program efforts has a strong and statistically significant relationship with total fertility rate *(Bongaarts, Mauldin, and Phillips 1990)*.

Faour *(1989)* uses the program effort index of 1982 to investigate the effect of socioeconomic setting and program effort in 11 Arab countries. The findings of the study yield consistent results.

A study by Mauldin and Ross *(1991)* examines the relationship of program effort, social setting, and fertility using the 1989 program effort scale. The dependent variable in their study is total fertility rate. The independent variables are the 1985 Human Development Index *(HDI)* and the average of 1982-1989 program effort components. This study finds that availability is strongly associated with both fertility decline and with the 1990 fertility level. The service and service-related variables are closely associated with fertility indices. Record keeping and policy variables are weakly associated with the indices *(Mauldin and Ross 1991)*.

In sum, the results of studies on the impact of family planning program under the socioeconomic conditions of developing countries have indicated a general agreement that both socioeconomic development and organized family planning programs play significant roles

in reducing fertility rate.

Research Design and Methodology

The objective of this sutdy is to examine the relationship between program effort components and total fertility rate under the socioeconomic conditions of LDCs. To achieve this objective, several hypotheses are constructed.

Hypotheses

The hypotheses of this study can be stated and tested as follows :

1. Socioeconomic variables and program effort components are correlated with total fertility rate.

2. Among four components of program effort, service and related activities; and availibility and accessibility of contraception have singificant negative effects on total fertility rate.

Operational Definitions

Socioeconomic development refers to demographic, social, and economic indicators of the studied countries in the analysis. These indicators are female literacy, per capita GDP, and percent of urban population.

Program effort refers to the sum of the policies adopted and implemented; the activities carried out to provide family planning knowledge, supplies, and services; the availability and accessibility of fertility regulation methods; and the monitoring and evaluation of all of these. Program effort is measured by Lapham and Mauldin's 30 item index *(1985b)*.

Total fertility rate is the average number of children that would be born per women, it she were to live to the end of her childbearing years conforming to the age-specific fertility rates *(World Bank 1984)*.

Sources of Data

The cross national study involves 90 less developed countries of the 1989 program effort study by Mauldin and Ross *(1991)*. Data on program effort and contraceptive prevalence are derived from the 1991 Population Council Data set which compiled basic variables on fertility, demographics, and program effort.

Data on socioeconomic settings: female literacy rate, and percent of urban population are derived from the ***World Development Report (World Bank 1991, 1992)*** while per capita GDP data are from the ***Industry and Development Global Report 1989/90 (UNIDO 1989)***.

Data on total fertility rate are derived from the ***World Development Report (World Bank 1992)***.

Variables

The variables in this study can be summarized as follows: (1) Dependent variable:Total fertility rate; (2) Independent variables: Program effort; (3) Control variables *(Socioeconomic development)*: fermale literacy, per capita GDP, and

urban population.

Statistical Procedures

Step 1: Data are encoded into computer program.

Step 2: Preliminary correlation analysis of data is performed to identify the multicollinearity among the independent variables.[1]

Step 3: Data are analyzed by multiple regression.

Analysis of Data

Extensive demographic analyses have documented on both aggregate and individual levels the negative relationship between socioeconomic factors: wealth, health, education, and urbanization; and fertility. Accordingly, we can hypothesize a negative relationship between level of socioeconomic development and the rate of fertility *(Ness and Ando 1984).* Previous studies on program effort component also indicate a strong and negative relationship between availability and fertility *(Lapham and Mauldin 1985a).* The results of data analysis displayed in table 1 show three models of fertility determinants. The first model indicated that social setting alone can explain 58% of variation of total fertility rate *(R-square = .58)* and only the parameter estimate of female litracy is statistically significant with an expected direction *(beta = -.72, t = -7.62).* The second model shows that the program effort alone can explain 58% of the variation of total fertility rate *(R-square = .58)* and only the availability coefficient is statistically significant with a negative relationship *(beta = -.91 , t = -8.55).* The third model with both social setting and program effort indicates a negative and statistically significant relationship between fermale literacy and total rate of fertility *(beta = -.45 , t = -4.88).* Per capita GDP and urbanization also have expected negative sign but not significant. Among program effort components, availability has a significant and negative coefficient as expected *(beta = -.46, t = -3.97).* Policy component has an expected negative sign while record keeping has an unexpected positive sign *(see table 1).* Consequently, among the independent variables, availability has the highest influence on total fertility rate *(beta = -.46),* followed by female literacy *(beta = -.45)* , policy *(beta = -.21)* and record keeping *(beta = -.21),* respectively. The combination of socioeconomic settings and program effort can explain 75% of variation in total fertility rate *(R-square = .75).* This suggests that program effort stengthens the relationship between socioeconomic settings and fertility.

[1] *Other socioeconomic factors excluded from this research are life expectancy and infant mortality because of high multicollinearity with female literacy.*

Table I

Comparison of Beta-Weight of Parameters for Social setting and Program Effort Components on TFR

Variables	Social Setting		Program Effort		SES + PE	
	beta	t-score	beta	t-score	beta	t-score
Constant	0.00	24.69	0.00	23.46	0.00	21.63
Policy			0.15	1.15	-0.21	-1.73*
Service			0.002	0.01	-0.005	0.03
Record			0.09	0.65	0.21	1.76*
Availability			-0.91	-8.55**	-0.46	-3.97**
GDP	0.06	0.63			-0.08	-0.99
Female literacy	-0.72	-7.62**			-0.45	-4.88*
Urbanization	-0.10	-0.90			-1.13	-1.33
Number of cases	75		90		75	
R - square	.58		.58		.75	
Adjusted R - square	.56		.56		.73	

*p < .10, two-tailed test.

**p < .05, two-tailed test.

Regions of the world differ in terms of socioeconomic development and level of fertility. For instance, Africa is seen as having minimal, even negative, economic growth with high fertility. It is interesting to compare the pattern of relationship between program effort components and total fertility rate in different regions. The results of data analysis, displayed in table 2, shows a negative and statistically significant relationship between urbanization and total rate of fertility in African region, ceteris paribus *(beta = -0.55, t = -3.65)*. Among program effort components, service and availability have the expected signs and statistically significance at the 90% level of confidence *(see table 2)*. Accordingly, the comparison of betaweight estimates indicate that service and service related activities has the highest impact on total fertility rate (beta = -.69), followed by urbanization, and availability *(beta = -.55 and -.37 respectively)*. Policy component, although presents a modest relationship *(beta = .37)*, is insignificant with an unexpected direction.

Fragmentarily, the result of South American region portrays different pictures. Only female literacy has an expected negative and significant coefficient *(beta = -.65, t = -3.41)*. None of program effort components has statisti-

program effort components has statistically significant coefficient *(see table 2)*. In addition, female literacy has the strongest association with total fertility rate.

For Asian and Pacific region, female literacy has the highest, expected negative, and statistically significant relationship with total fertility rate *(beta = -.62, t = -3.58)* as well as per capita GDP *(beta = -.48, t = -2.50)*. While program effort components have insignificant relationship with total fertility rate, however policy and availability portray modest relationships *(beta = -.55,and -.42 respectively)*.

Table II

Comparison of Beta-Weight of Paramenters for Program Effort Components on TFR for Different Regions

Variables	Africa		South America		Asia-Pacific	
	beta	t-score	beta	t-score	beta	t-score
Constant	0.00	15.62	0.00	9.12	0.00	7.31
Policy	0.37	1.37	-0.25	-1.18	-0.55	-1.47
Service	-0.69	-1.92*	0.20	0.57	0.27	0.49
Record	-0.01	-0.05	0.14	0.44	0.11	0.27
Availability	-0.33	-1.89*	-0.27	-1.42	-0.42	-0.99
GDP	0.55	0.28	0.10	0.46	-0.48	-2.50**
Female literacy	0.13	0.76	-0.65	-3.41**	-0.62	-3.58**
Urbanization	-0.55	-3.65**	-0.20	-0.84	0.37	1.70*
Number of cases	34		19		22	
R - square	.64		.81		.79	
Adjusted R - square	.55		.69		.68	

*p < .10, two-tailed test.

**p < .05, two-tailed test.

Recently, there has been the attempt to propose the new typology which based on the levels of modern method prevalence to analyze family planning programs. The rational for the proposed typology is that although regional characteristics continue to be important, however the differences among countries within particular region are now so great that regional framework may not be adequate to explain the variations *(Stover 1989)*. These categories are:

1. Emergent, with 0 to 7% prevalence among married women of repro-

ductive age (MWRA)

2. Launch, with prevalence between 8-15%

3. Growth, with prevalence between 16-34%

4. Consolidation, with 35-49% prevalence rate

5. Mature, with prevalence of 50% or higher.

Due to the limitation of available cases, I combine emergent and lauch on one hand, and growth and consolidation on the other. Mature group stays the same, without any summation.

The result of data analysis on the emergent and launch group indicates that only urbanization has a negative and statistically significant relationship with total fertility rate *(beta = -.97, t = -3.20).* Among program effort components, availability has a negative and significant coefficient *(beta = -.69, t = -2.89).* Policy also has an expected negative and statistically significant relationship at 90% confidence level *(beta = -.99, t = -1.69),* however this relationship is very strong. Surprisingly, record keeping has a significant but unexpected positive relationship with total fertility rate *(beta = .81, t = 2.70, see table 3).*

For growth and consolidation group, among socioeconomic factors, only female literacy has a negative but modest relationship with total fertility *(beta = -.38, t = -1.75).* Among program effort components, only policy has a strong negative and statistically significant parameter estimate *(beta = -.79 , t = -2.87),* while others do not *(see table 3).*

Fragmentarily, the mature group shows unusual picture. Neither socioeconomic factors nor program effort components have significant relationship with total fertility. However , among socioeconomic settings, urbanization and female literacy produce modest relationships *(beta = -.51 and -.47 repectively)* while service and availability produce modest associations among program effort components *(beta = -.46 , and -.31 repectively).*

Consequently, the insignificant paramenter estimates from the mature group may lead readers to argue that program effort does not make a difference in reducing population growth. However, the results of the analyses that incorporate program effort index as a whole do not support such argument. The results of the analyses presented in table 4 indicate that program effort has a positive and statistically significant relationship with total fertility rate in both growth and consolidation group, as well as the mature group *(beta = -.7 , t = -3.04 and beta = -.57 , t = -2.45 respectively).* Among socioeconomic factors, female literacy has statistically significant relationship with total fertility rate in both growth and consolidation; and mature groups *(beta = -.4 , t = -1.85 and beta =-.53 , t = -2.35 respectively).* Urbanization is statistically signficance in

emergent and launch group (*beta = -.79, t = -1.88, see table 4*). Thus, the evidence tend to support that program effort does make a difference in reducing fertility.

Table III

Comparison of Beta-Weight of Parameters for Program Effort Components on TFR for Different Prevalence Level

	Emergent & Launch		Growth & Consolidation		Mature	
Variables	beta	t-score	beta	t-score	beta	t-score
Constant	0.00	11.35	0.00	4.71	0.00	4.07
Policy	-0.99	-1.69*	-0.79	-2.87**	0.17	0.31
Service	0.05	0.11	0.54	1.38	-0.46	-0.56
Record	0.81	2.70**	-0.33	-1.29	-0.05	-0.08
Availability	-0.69	-2.89**	-0.24	-1.00	-0.31	-0.97
GDP	0.03	0.10	0.36	1.32	0.35	0.73
Female Literacy	0.22	1.05	-0.38	-1.75*	-0.47	-1.38
Urbanization	-0.97	-3.20**	-0.19	-0.55	-0.51	-1.29
Number of cases	17		21		15	
R - square	.74		.61		.58	
Adjusted R - square	.54		.40		.16	

*p < .10, two-tailed test. **p < .05, two-tailed test.

Table IV

Comparison of Beta-Weight of Parameters for Program Effort on TFR for Different Prevalence Level

	Emergent & Launch		Growth & Consolidation		Mature	
Variables	beta	t-score	beta	t-score	beta	t-score
Constant	0.00	8.97	0.00	6.55	0.00	5.77
Program Effort	-0.51	-1.63	-0.70	-3.04**	-0.57	-2.45**
GDP	0.14	0.34	0.31	1.24	0.29	0.91
Female Literacy	0.03	0.09	-0.40	-1.85*	-0.53	-2.35**
Urbanization	-0.79	-1.88*	-0.44	-1.42	-0.49	-1.55
Number of cases	17		21		15	
R - square	.30		.44		.54	
Adjusted R - square	.07		.30		.35	

*p < .10, two-tailed test. **p < .05, two-tailed test.

Conclusion and Discussion

Previous studies have indicated that education has the consistent pattern of strong negative influence over fertility. As couples become more educated, they tend to have less children. The result of this analysis confirms this pattern of relationship. However, on the part of program effort components, availability still plays a major role in reducing total fertility rate. Surprisingly, service activities do not present a significant role in this study. Instead, policy and stage setting activities; and record keeping and evaluation tend to have at least statistically significant relationship with fertility at 90% confidence level.

The comparison of these relationships among different regions portrays fragmented results. In Africa, urbanization plays the most influence role among socioeconomic variables as well as service and availability. Female literacy shows a significant and strong negative relationship in both South American and Asia-Pacific regions, while none of program effort components presents significant relationship in these two regions. In addition, per capita GDP and urbanization present a significant role in Asia-Pacific.

Still another comparison among countries with different levels of prevalence portrays different results. In emergent and launch group, availability and policy have strong negative and statistically significant relationship with fertility. In growth and consolidation group, only policy indicates strong and statistically significant relationship. For socioeconomic factors, only urbanization has significant relationship in emergent and launch group while female literacy has significant relationship in growth and consolidation group. Surprisingly, none of socioeconomic or program effort variables has significant relationship with fertility in mature group. This indicates the big differences in different levels of prevalence. In mature group, it might be that almost all couples know about methods and realize their utility as well as the readily services and available access to birth control provided by private sectors so family planning programs do not make a big differece in this area. While countries with emergent and launch may need both strong family planning policy and readily available access to family planning methods through family planning program in order to reduce fertility. Additionally, when program effort index as a whole was included in the analyses, significant relationships were found in growth and consolidation, as well as in mature group. These evidences confirm that family planning programs could make a difference in reducing fertility.

Policy Relevance

This study is related to family planning policy in that it may identify the effect of family planning program

components that could have strong influence on total fertility rate. Thus, potential policy implementation may be identified form the findings of this research.

Potential Policy Implications

The findings of this study contribute to family planning program administration and implementation in that among four program effort components: policy stage settings; services and service related activities ; record keeping and evaluation ; and accessibility and availability , only availability and policy have strong impact on total fertility rate. Thus, in order to implement family planning programs, policy makers have to take the regional differences and different stages of prevalence of the countries into account. Especially in countries with low prevalence rate, access to service accompanied with strong and supported family planning policies and programs, and socioeconomic development are needed to reduce fertility. □□

APPENDIX

Countries are categorized into the typology of levels of contraceptive prevalence as follows:

Emergent with 0 to 7% of prevalence

Africa	Benin, Ivory Coast, Lesotho, Liberia, Malawi, Mali, Mauritania, Uganda and Cameroon
S. America	-
Asia & Pacific	Afghanistan and Pakistan

Launch with 8 to 15% of prevalence

Africa	Burundi, Ghana, Nigeria, Rwanda, Senegal, Sudan and Togo
S. America	Haiti
Asia & Pacipic	Iraq and Nepal

Growth with 16 to 34% of prevalence

Africa	Botswana and Kenya
S. America	Bolivia, Guatemala and Nicaragua
Asia & Pacipic	Bangladesh, Iran and Syria

Consolidation with 35 to 49% of prevalence

Africa	Algeria, Egypt, Morocco, S. Africa and Zimbabwe
S. America	Ecuador, El Salvador, Guyana, Honduras, Paraguay, Peru and Venezuela
Asia & Pacific	Fiji, India, Indonesia, Jordan and Philippines

Mature with prevalence of 50% or higher

Africa	Mauritius and Tunisia
S. America	Brazil, Columbia, Costa Rica, Cuba, Dominican Republic, Jamaica, Mexico Panama and Trin. & Tobacco
Asia & Pacific	China, Hong Kong, Korea Rep., Lebanon, Malaysia, Singapore, Sri Lanka, Taiwan, Thailand, Turkey and Vietnam

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