DEGREE OF PREFERENCE IMPLEMENTATION AND FERTILITY CHANGES IN DEVELOPING COUNTRIES

by

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ABSTRACT

The 1994 International Conference on Population and Development (ICPD) held in Cairo emphasized 'the right of men and women to be informed and to have access to safe, effective, affordable and acceptable methods of family planning of their choice, as well as other methods of their choice for regulation of fertility which are not against the law'. These rights rest on the recognition of the basic right of all couples and individuals to decide freely and responsibly the number, spacing and timing of their children. Thus, various national governments have demonstrated their support for these resolutions by promoting contraceptive use in many ways. However, the question remains as to what extent couples have been able to implement their fertility desires. The need therefore exists to examine the extent to which observed changes in fertility in developing countries can be explained by the ability of individuals or couples to implement their fertility desires through informed choice of family planning methods

In this study, we applied Bongaarts variant of Easterlin's supply-demand framework for the analysis of fertility to the Demographic and Health Survey (DHS) data from sixty developing countries to estimate the level of preference implementation. Decomposition of the determinants of fertility was done using 27 of the 60 countries, which has data sets before and after the 1994 ICPD. The regression of preference implementation on the 1998 United Nations Human Development Index was also done to establish the relationship between the two.

The result shows variation in the values of preference implementation especially between the countries of Sub-Saharan Africa (SSA) and others. It is shown that the attainment of couple's fertility preference is quite low in SSA. The decomposition procedure shows that preference implementation is a more important determinant of fertility decline than wanted fertility. The importance of the degree of preference implementation and the implication of this finding is discussed. The need for further investigation into the use of degree of preference implementation in demographic research is emphasized.

Introduction

Demographers have been engaged in debates over the relationship between population and development. At the international level, the population issue was given a new lease of life in the 1970s when population explosion was said to be imminent. Various conferences have been held to address the problems associated with increasing population growth in the developing countries. Of all these, the International Conference on Population and Development (ICPD), held in Cairo in 1994 is regarded as a watershed in demographic discourse (United Nations, 1994). The Conference noted and recommended that in order to address population and development problems in developing countries, all sociocultural obstacles to achieving gender equity should be removed. It further recommended that birth control methods should be made available, affordable and accessible to all men and women that are desirous of it.

History of fertility changes in the developing countries shows that in the early 20th Century, most of Africa, Asia and Latin America were still in the pre-demographic transition state of high mortality and high fertility. In the 1950s, the high fertility and declining mortality in the developing world fueled the explosive population growth that captured wide public attention in the 1960s and increased the tempo of international efforts at slowing population growth. These efforts culminated in numerous conferences to address the rapid population growth in these countries. By the end of the 20th century, evidences of fertility decline have been shown in most of the developing countries but paths to this lower fertility vary. Currently, the total fertility rate (TFR) in Asia, Latin America and the Caribbean stands at 2.6 and it is 5.1 in Africa with wide variation within each region. For example, TFR is 2.0 in Tunisia, North Africa and 8.0 in Niger, West Africa (Population Reference Bureau, 2005).

Despite the differences in interpretation given for these trends, many analysts see fertility transition as a complex process that involves key roles for changes in the demand for children as well as for the diffusion of new attitudes about birth control and for greater accessibility to contraception provided by various family planning programs in these countries. (Retherford & Palmore, 1983; Cleland & Wilson, 1987; Freedman & Freedman, 1991; Phillips & Ross 1991; Mason 1997; Feyisetan & Bankole, 2004). However, according to Bongaarts (1993), how much of these fertility transitions in less developed countries can be attributed to these explanatory factors remains a veritable research question that needs to be answered.

A number of analytical models have been designed to identify and measure the determinants of fertility (Easterlin, 1975; Bongaarts, 1978, 1993; Easterlin & Crimmins, 1985). The Easterlin's economic framework is a model of behavioral and biological factors affecting fertility in developing countries. It has proven influential as it continues to inform the thinking of demographers and economists.

The model consists of three central concepts: demand for children; the potential supply of children, and the momentary and psychic costs of contraception. According to the model, couples whose potential supply exceeds demand would consider contraception, taking

account of contraceptive costs in choosing among family planning methods (Montgomery, 1987). Though the model is simple and attractive, it cannot address dynamic issues and has not succeeded in quantifying these factors in acceptable manner (Bongaarts, 1993; Ibisomi, 2002). Lack of uniformity in the collection of survey data to address the concepts used in the model could also be problematic.

In order to address the above shortcomings, Bongaart (1993) proposed an alternative approach to the implementation of the original model. The variant differs from Easterlin's formulation in the following ways: it measures reproductive performance in terms of births (being period-based). Additionally he introduced a new variable called the degree of preference implementation to quantify the roles of the costs of fertility regulation and unwanted childbearing. Degree of preference implementation is the net result of a decision-making process in which couples weigh the cost of fertility regulation and the cost of unwanted pregnancy.

Emerging from the model is the fact that fertility (measured by the total fertility rate) is a function of three determinants namely: supply of births (natural fertility), demand for births (wanted fertility) and degree of preference implementation. The latter in turn is dependent on cost of fertility regulation and that of unwanted childbearing.

The key variables and their relationship with fertility are illustrated below:

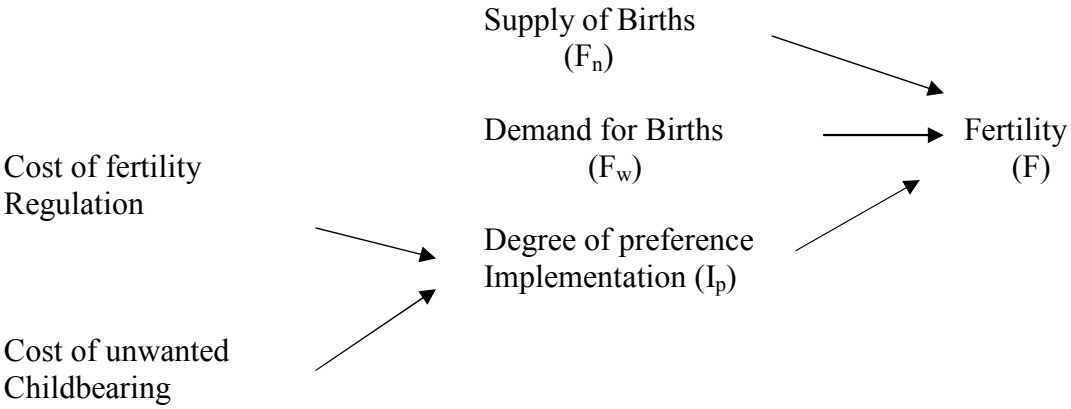

Figure 1. Key variables and interrelations in variant of supply-demand model.
Source: Bongaarts, J. (1993). The supply-demand framework for the determinants of fertility: An alternative implementation.

Supply of births **(F_n)** is measured as natural total fertility. Natural fertility means the rate of childbearing that would prevail in the absence of deliberate efforts by couples to limit family size. Demand for births **(F_w)** is measured as wanted total fertility. Wanted fertility is the rate of childbearing that would be achieved if all women were able to eliminate unwanted births.

The third variable, the degree of preference implementation **(I_p)** is measured by an index with values ranging from 0 to 1. In general, the index rises as cost of regulation declines and that of unwanted children increases. If couples fully implement their fertility

preferences, the index is equal to unity. This signifies that no unwanted births occur and actual fertility equals wanted fertility). Conversely, if the index is equal to zero, the observed fertility equals natural fertility, that is, fertility in the absence of deliberate fertility control. The value of the index chosen by couples determines where actual fertility falls within the range set by wanted and natural fertility.

The dependent variable, total fertility rate (F) gives the estimate of the number of children a woman would have by the end of her childbearing years if she were to pass through those years bearing children at the currently observed age specific rates. The model shows that the operation of these variables determines the level of fertility in a community or society. In this variant of the original Easterlin's model, infant-child mortality affects the demand for births rather than their supply. Parents are considered to have a specific desired fertility size and they translate the goal into a level of desired fertility after taking into account past child losses as well as risk of future child mortality. According to this variant, as society develops, the trend in actual fertility is a function of trends in wanted fertility, natural fertility and preference implementation. Wanted fertility declines over time as a result of changes in the costs and benefits of children as well as reductions in infant-child mortality. The index of preference implementation rises as fertility regulation costs decline and its benefits rise and the benefit of fertility regulation is in the elimination of unwanted births (Bongaarts, 1993; Montgomery 1987).

According to Bongaarts (1993), the relationship between the variables and fertility can be expressed in statistical form as follows:

$$F = F_w + F_u \quad (1)$$

where F is total fertility (births per woman), F_w is wanted fertility and F_u is unwanted fertility (which can simply be expressed as $F - F_w$).

Also,

$$F_u = (F_n - F_w) \times (1 - I_p) \quad (2)$$

where F_n is total natural fertility and I_p is the index of preference implementation with values ranging from 0 to 1. With full preference implementation, $I_p = 1$ (which implies that $F_u = 0$ and $F = F_w$) and I_p is 0 with no preference implementation (This implies a substantial level of unwanted childbearing and $F = F_n$).
F_u is a function of the difference between supply and demand, and the degree of preference implementation.

Substitution of (2) in (1) yields

$$F = F_w \times I_p + Fn \times (1 - I_p) \quad (3)$$

Natural fertility

$$F_n = F/C \quad (4)$$

where C is an index between 0 and 1 that measures the proportional reduction in natural fertility attributable to deliberate birth control.

$$C = 1 - 1.02 \times U \quad (5)$$

where U represents the proportion of married women who practice contraception. Substitution of (5) in (4) gives an estimate of F_n while rearranging equation (3) gives

$$I_p = (F_n - F)/(F_n - F_w) \quad (6)$$

Equation 6 can now be used to estimate the degree of preference implementation once natural fertility, actual fertility and wanted fertility are known.

Data and Method

Data

The study is a secondary data analysis of various sets of national Demographic and Health Survey (DHS) data sets of sixty developing countries and the 1998 Human Development Index (HDI) of twenty-seven selected developing countries. The DHS is a project with technical support from Macro International Inc. The project assists countries worldwide in conducting surveys to obtain information on key population and health indicators. The DHS is a nationally representative probability sample of women aged 15-49.

Generally for most of the countries, the samples were selected in two or three stages. Most used the population census enumeration area (EA) list as sampling frames while others used specially commissioned surveys (DHS country reports). The survey data sets contain all the information needed to estimate the supply of and demand for births and the preference implementation index. Further information can be obtained from Macro International Inc or the individual country DHS report. The HDI (published in the United Nations 1998 Human Development Report) is a simple summary measure of three dimensions of the human development concept: living a long and healthy life, being educated and having a decent standard of living. It thus combines measures of longevity (as measured by life expectancy at birth), educational attainment (as measured by a combination of adult literacy and gross enrolment ratio) and standard of living (as measured by real gross domestic product per capita).

The HDI however omits vital aspects of human development, notably the ability to participate in the decisions that affect one's life. For example, a person can be rich, healthy and well educated, but without this ability, human development is held back (Human Development Report 2002). Human development concept is a broader and more complex concept than what is captured by the HDI. Human development is the expansion of capabilities that widen people's choices to lead lives that they value. This includes for example, political freedom, participating in the life of one's community and physical security. While some of these capabilities are not any less important, they are difficult to measure appropriately and are therefore excluded in the computation of the HDI.

Data analysis

MS Excel and Statistical Package for Social Scientists (SPSS) for Windows Version 9 were used for the analysis. There were three levels of analysis. The first was estimating the degree of preference implementation for sixty countries (29 from Sub-Saharan Africa (SSA), 9 from the Near East/North Africa, 9 from Asia and 13 from Latin America & the Caribbean. This grouping of countries is adopted from Macro International grouping of countries). The second level was the decomposition of fertility trends of 27 countries with trend data spanning pre and post 1994 ICPD. The procedure was done to examine the contribution of degree of preference implementation to fertility decline in specific populations. The third level was to examine the relationship between socio-economic development and the degree of preference implementation in the 27 countries. To achieve this, three regression analyses were carried out (one for each mediating variable) using the level of socio-economic development (represented by the UN Human Development Index) as the independent variable.

At the first level of analysis, the dependent variable was total fertility rate (F), which is provided by the various DHS reports. The independent variables were supply of births (F_n), demand for births (F_w) and the degree of preference implementation (I_p). The formula used in the derivation of F_n and I_p (as proposed by Bongaarts, 1993) are contained in equations 4 and 6 in the methodology section respectively while values for F_w are given in the DHS reports. Formula for the decomposition procedure (at the second level) is contained in equation 8 below:

The application of this procedure requires that estimates of observed, wanted and natural fertility, as well as the index of implementation are available for two successive points in time t_1 and t_2 in the same population (Bongaarts, 1993). Following the Bongaarts formulation again, the following variables were used

	Observation point	
	t_1	t_2
Observed fertility	F_1	F_2
Natural fertility	F_{n1}	F_{n2}
Wanted fertility	F_{w1}	F_{w2}
Index of preference implementation	I_{p1}	I_{p2}

The decline in fertility between t_1 and t_2 is simply equal to $F_1 - F_2$, and this difference can be expressed as a function of the mediating variables by substitution of equation (3)

$$F_1 - F_2 = [F_{w1}I_{p1} + F_{n1}(1 - I_{p1})] - [F_{w2}I_{p2} + F_{n2}(1 - I_{p2})] \quad (7)$$

Since the emphasis here is on examining changes in fertility that result from changes in determinants, this equation can be rewritten as

$$\Delta F = \Delta F_w \bar{I}_p + \Delta I_p (\bar{F}_w - \bar{F}_n) + \Delta F_n (1 - \bar{I}_p) \quad (8)$$

where ΔF, ΔF_w, ΔF_n and ΔI_p represent absolute changes in F, F_w, F_n and I_p

respectively and $\bar{F}_w$, $\bar{F}_n$, and $\bar{I}_p$ are the average values of F_w, F_n and I_p

respectively.

Equation (8) conveniently divides the observed fertility decline ΔF into three components corresponding to each of the three determinants

Change in	**Contribution to fertility decline ΔF**
Natural fertility ΔF_n	$\Delta F_n (1 - \bar{I}_p)$
Wanted fertility ΔF_w	$\Delta F_w \times \bar{I}_p$
Index of implementation ΔI_p	$\Delta I_p (\bar{F}_w - \bar{F}_n)$

The above shows that contribution of a change in wanted or natural fertility to the observed fertility decline depends on the average level of implementation index. Similarly, the fertility effect from a given change in the index of implementation depends on the average between natural and wanted fertility ($F_n - F_w$). The percentage contribution of each of the determinants to fertility decline can also be obtained by multiplying the ratio of change of each of the determinants to total fertility change by 100.

Results

Levels of fertility preference implementation index

Our analysis shows that indices of preference implementation for all the sixty countries considered range from 0.37 in Haiti [the Caribbean] to 0.96 in Uzbekistan [Asia]. The indices have been categorized into three groups as follows: <0.50 grouped as low, 0.50-0.69 medium and ≥0.70 as high.

Table 1. Percentage distribution of countries in the regions according to their level of preference implementation using the most recent survey.

Region	Ip (%)			Number of Countries
	Low	Medium	High	
Sub-Saharan Africa	38	34	28	29
Near East/North Africa	11	11	78	09
Asia	00	22	78	09
Latin America & Caribbean	08	00	92	13

It is also shown that attainment of couple's fertility preference is quite low in Sub-Saharan Africa. In other words, most Sub-Saharan African couples have not been able to implement their fertility preferences. Only 28% of the countries in the region fall within

the high range. A sizeable proportion of the other regions fall in the high range especially in Latin America and the Caribbean where all the countries except Haiti fall in the high range group.

Changes in preference implementation index.

All countries with two or more data sets show an increase in I_p over the years except for the Sub-Sahara African countries of Burkina Faso, Mali and Togo. Table 2 below shows that of the countries with positive growth in fertility preference implementation, Uganda has the highest percentage increase at 75%. Kenya, Zambia, Yemen, Bolivia and Guatemala have growth between 25 and 50% while the growth for the rest of the countries is below 25%.

Table 2. Percentage change in I_p, F_w and F_n in twenty-seven developing countries.

		I_p			F_w			F_n	
Countries	**I_{p1}**	**I_{p2}**	**% Change**	**F_{w1}**	**F_{w2}**	**% Change**	**F_{n1}**	**F_{n2}**	**% Change**
Sub-Saharan Africa									
Burkina Faso	0.76	0.56	-26.32	5.8	5.7	-1.72	8.7	7.3	-16.09
Cameroon	0.66	0.70	6.06	5.2	4.3	-17.31	6.9	6.0	-13.04
Ghana	0.58	0.61	5.17	4.2	3.6	-14.29	6.6	5.7	-13.64
Kenya	0.57	0.72	26.32	3.4	3.5	2.94	8.1	7.8	-3.70
Madagascar	0.58	0.65	12.07	5.2	5.2	0.00	7.4	7.5	1.35
Mali	0.42	0.41	-2.38	6.6	6.0	-9.09	7.5	7.2	-4.00
Niger	0.62	0.77	24.19	6.8	7.0	2.94	7.3	7.9	8.22
Nigeria	0.66	0.71	7.58	5.8	4.8	-17.24	6.4	6.2	-3.12
Senegal	0.36	0.44	22.22	5.1	4.6	-9.80	6.5	6.6	1.54
Tanzania	0.55	0.66	20.00	5.6	5.1	-8.93	6.9	7.1	2.90
Togo	0.71	0.62	-12.68	5.0	4.2	-16.00	9.8	6.8	-30.61
Uganda	0.28	0.49	75.00	6.4	5.6	-12.50	7.8	8.1	3.85
Zambia	0.52	0.71	36.54	5.4	5.2	-3.70	7.7	8.3	7.79
Near East/North Africa									
Egypt	0.75	0.77	2.67	2.7	2.6	-3.70	7.5	7.0	-6.67
Jordan	0.69	0.77	11.59	3.9	2.9	-25.64	9.5	9.5	0.00
Yemen	0.33	0.48	45.45	6.0	4.6	-23.33	8.5	8.3	-2.35
Turkey	0.85	0.87	2.35	1.7	1.9	11.76	6.9	7.5	8.70
Asia									
Bangladesh	0.71	0.74	4.23	2.2	2.1	-4.55	6.3	6.7	6.35
India	0.75	0.79	5.33	2.6	2.1	-19.23	5.8	5.5	-5.17
Indonesia	0.86	0.91	5.81	2.5	2.4	-4.00	6.1	6.8	11.48
Philippines	0.70	0.78	11.43	2.9	2.7	-6.90	6.9	7.2	4.35
Latin America & Caribbean									
Bolivia	0.49	0.71	44.90	2.7	2.5	-7.41	7.2	8.3	15.28
Brazil	0.87	0.93	6.90	2.3	1.8	-21.74	10.5	11.5	9.52
Colombia	0.89	0.91	2.25	2.1	2.2	4.76	8.6	11.4	32.56
Dominican Republic	0.86	0.89	3.49	2.6	2.5	-3.85	7.8	9.1	16.67
Guatemala	0.61	0.78	27.87	4.4	4.1	-6.382	7.2	8.2	13.89
Peru	0.78	0.84	7.69	2.0	2.2	10.00	8.8	10.1	14.77

It is also shown that wanted fertility fell in almost all the countries except Kenya (3% increase), Niger (3% increase), Turkey (12% increase), Colombia (5% increase) and Peru (10% increase).

Contribution of I_p, F_w and F_n to fertility decline

Fertility decline for all the countries between the two surveys average 0.46 births per woman. It was 0.5 in Sub-Saharan Africa, 0.63 in Near East/North Africa, 0.32 in Asia and 0.35 in Latin America & the Caribbean.

Table 3. Absolute and percentage contribution of I_p, F_w, and F_n to fertility decline.

		Absolute contribution to fertility decline			% contribution to fertility decline		
Regions	**F**	**F_w**	**I_p**	**F_n**	**F_w**	**I_p**	**F_n**
SSA	0.50	0.25	0.12	0.13	49.68	24.14	26.18
NE/NA	0.63	0.30	0.29	0.04	47.87	45.95	6.18
Asia	0.32	0.17	0.20	-0.05	53.51	61.87	-15.38
LA & C	0.35	0.10	0.51	-0.26	29.09	143.60	-72.69
Total	0.46	0.21	0.25	0.00	46.15	53.93	-0.09

Contributions to this fertility change by I_p, F_w, and F_n for all the countries are 0.25, 0.21 and 0 births per woman, respectively. Latin America countries have the highest level of absolute contribution of the I_p while Sub-Saharan Africa has the lowest. Percentage contribution of I_p to fertility decline was highest in Latin America and the Caribbean (144%), followed by Asia (62%), Near East/North Africa (46%) and then Sub-Saharan Africa (24%). Wanted fertility played a more dominant role in fertility decline in Sub-Saharan Africa accounting for about 50% of fertility decline. Percentage contribution of F_w to fertility decline is highest in Asia (54%) followed by Sub-Saharan Africa (50%), Near East/North Africa (48%) and then Latin America and the Caribbean (29%). On average, I_p accounted for 54% of the observed decline while reduction in wanted fertility is responsible for the remaining fertility change (46%).

Human Development Index and Fertility

Socioeconomic development factors may also influence fertility directly through family planning programs and behaviors and other proximate variables to fertility (Poston, 2000). Hence the relative role of socio-economic development in determining levels of fertility is looked at here by examining the mediating roles of supply, demand and preference implementation. Three regression analyses were carried out to examine this relationship, one for each of the mediating variables. Each of the regressions used the human development index (the level of socio-economic development as measured by the United Nations) as the independent variable. The regression results are summarized in the following equations.

$I_p = 0.415 + 0.589h$ (i)

$F_w = 7.023 – 6.491h$ (ii)

$F_n = 5.506 + 4.484h$ (iii)

Equation (i) implies that development has a positive effect on preference implementation. This is consistent with the observed general increase in the index of preference implementation among the countries over time. Development also has a highly significant reducing effect on wanted fertility (equation ii), which is also consistent with the observed trend in wanted fertility between the two surveys while it has an increasing effect on F_n (perhaps with better quality of life in the course of development).

Table 4. Levels of Ip, Fw, Fn and h for twenty-seven developing countries using the most recent DHS and the 1998 HDI.

Countries	Ip	Fw	Fn	h
Sub-Saharan Africa				
Burkina Faso	0.56	5.7	7.3	0.22
Cameroon	0.70	4.3	6.0	0.48
Ghana	0.61	3.6	5.7	0.47
Kenya	0.72	3.5	7.8	0.46
Madagascar	0.65	5.2	7.5	0.35
Mali	0.41	6.0	7.2	0.24
Niger	0.77	7.0	7.9	0.21
Nigeria	0.71	4.8	6.2	0.39
Senegal	0.44	4.6	6.6	0.34
Tanzania	0.66	5.1	7.1	0.36
Togo	0.62	4.2	6.8	0.38
Uganda	0.49	5.6	8.1	0.34
Zambia	0.71	5.2	8.3	0.38
Near East/North Africa				
Egypt	0.77	2.6	7.0	0.61
Jordan	0.77	2.9	9.5	0.73
Yemen	0.48	4.6	8.3	0.36
Turkey	0.87	1.9	7.5	0.78
Asia				
Bangladesh	0.74	2.1	6.7	0.37
India	0.79	2.1	5.5	0.45
Indonesia	0.91	2.4	6.8	0.68
Philippines	0.78	2.7	7.2	0.68
Latin America & Caribbean				
Bolivia	0.71	2.5	8.3	0.59
Brazil	0.93	1.8	11.5	0.81
Colombia	0.91	2.2	11.4	0.85
Dominican Republic	0.89	2.5	9.1	0.72
Guatemala	0.78	4.1	8.2	0.62
Peru	0.84	2.2	10.1	0.73

Discussion and Conclusion

This variant of the Easterlin model allows convenient quantification of the three key determinants of fertility: the supply of and demand for births, and the degree of preference implementation. Prior to this formulation, there has been no such link between fertility and its basic determinants. Indices of preference implementation were calculated for 60 developing countries. Changes in fertility were decomposed to estimate the contribution of each of the determinants (this was done for 27 countries with trend data) to fertility decline. Relationship between development and the fertility determinants was also examined.

The results show wide variation in the value of preference implementation especially between the countries of Sub-Saharan Africa (with only 28% of the countries having indices ≥ 0.70) and the others. This lag among the Sub-Saharan Africa (SSA) countries could be due to variation in family planning program efforts in the regions as well as socio-cultural norms. This perhaps is similar to the finding of Ross & Stover (2001) who found in their study that the SSA countries had extremely weak family planning programs leading to a low family planning program effort index. (The index measures 30 features of program effort, which permits an examination of the relationship between effort and outcomes. The low score among SSA countries was attributed to varying program characteristics in the countries – Ross & Stover, 2001).

Generally, the fertility implementation index increased while wanted fertility declined over the years for countries with trend data. This observed increase in indices of fertility preference implementation (I_p) could be as a result of improved program effort by the various governments in making contraception available, accessible and affordable to their populace as well as improved contraceptive technology. The observed trend in wanted fertility could be due to changes in the costs and benefits of children, which makes couples to desire smaller family sizes; declining mortality, which leads to the survival of many more children hence pressure on the family resources; growing individualism and desire for other goods and sources of satisfaction.

Fertility decline for all the countries with the two surveys average 0.46 births per woman with the highest decline of 0.63 in Near East/North Africa region and the lowest of 0.32 in Asia. This observed decline could be as a result of the relatively low costs and high benefits associated with fertility control; reduced time span that women spend in reproductive activities as they pursue educational goals, which has been leading to higher age at first marriage and first birth; incompatibility of childbearing/rearing with labour force participation for women and the high cost of childbearing and rearing.

The decomposition procedure using data from two sets of Demographic and Health Survey of twenty-seven developing countries indicate that on the average, changes in fertility were largely due to degree of fertility preference implementation and changes in wanted fertility. Preference implementation was found to be a more important determinant of fertility decline than wanted fertility. They contributed 54% and 46% respectively. This finding is similar to that of Bongaarts (1993). The change between the

two periods could be as a result of shifts in fertility and improvement in contraceptive usage. The developing countries contraceptive choice index generally improved between 1982 and 1994. Most countries especially SSA countries however fall into the poor category with index of less than forty (Population Reference Bureau Inc 1988, 1994, 1996, 2000; Population Action International, 1997). However, there is variation in the factor that is more dominant in each region. For example, wanted fertility played a more dominant role in fertility decline in Sub-Saharan Africa and Near East/North Africa while the implementation index is the dominant factor in Asia and Latin America/Caribbean. This variation could be as a result of the level and strength of reproductive health services and facilities in the various regions, the stage of the various regions in fertility transition as well as socio-cultural and economic factors. It is note worthy to mention that on the average, natural fertility contributed negatively to fertility decline though this is negligible. The negative contribution is marked in the Latin America/Caribbean and Asia regions. This could be as a result of improving standard of living and changing patterns of childbearing/rearing. For example, shorter duration of breastfeeding and reduction in foetal loss due to improved medical advancement both reduce natural birth intervals and this should ordinarily increase natural fertility. Better nutrition and now widely available treatment for infecund couples could also have increasing effect on natural fertility.

The analysis of the effects of development on the mediating variables shows that development has the expected positive influence on implementation preference and negative effect on wanted fertility. This was also similar to that found by Bongaarts (1993). Potter, Schmertmann & Cavenaghi, (2002) also found a strong and consistent relationship in Brazil between fertility decline and changes in socio-economic conditions. Development has substantially affected fertility indirectly by its effect on mortality. The fall in mortality rates as a result of improved living standards, spread of education and early public health measures created so much pressure in the family that conscious effort had to be taken to reduce family size. With these, the evident waste of human resources was lessened. High morbidity associated with mortality was also greatly reduced. It was also noted that lower fertility may improve access to health services and education and more generally expand opportunities to escape poverty. Changes in economic development in particular have been shown to affect the overall costs and social value of children (Poston, 2000; Potter, Schmertmann & Cavenaghi, 2002; McNicoll, 2003).

The results of the analysis clearly show the importance of the degree of fertility preference implementation index. It tells the extent to which people have been able to implement their fertility preferences and by extension, measures the achievement of the various governments against their goals of providing family planning services to their people. This evaluation index can assist governments in designing and implementing appropriate strategies for the achievement of the set targets.

It is therefore recommended that development programmes are invested in, improved upon and pursued vigorously. This is in view of the strong positive relationship between development and the degree of preference implementation, which shows that the ability of people to implement their fertility preferences increases in the course of development.

It is also recommended that reproductive health service delivery systems be improved upon. This can be done by increasing and extending service delivery points to all corners of each country, providing adequate human and material resources as well as logistic support for the sustainability and continuity of the systems. That is, governments should ensure that reproductive health services are available, accessible and affordable to that segment of the population that is desirous of the service.

Practical, meaningful and more effective collaboration between researchers and the respective government agencies in the design and implementation of policy programmes aimed at helping the populace achieve its fertility desires as aptly enunciated in the 1994 ICPD Resolutions is also recommended. The wide disparities in the index of preference implementation among countries and over time clearly indicate that gaps exist between programme objectives and their results. It is therefore imperative that governments and researchers work together to bridge these gaps.

In terms of research, the need exists to investigate how well the degree of preference implementation is a measure of the ability of couples and individuals to implement their fertility desires. There is further need to examine the various groupings within each country as opposed to variability across countries considered in this work. This will provide a greater and better insight into associated social, cultural, economic, political, and other factors that affect degree of preference implementation and wanted fertility in individual countries.

Efforts should also be made to operationalize the relationship between the degree of preference implementation and its basic determinants namely: cost of unwanted childbearing and that of fertility regulation.

The ways and means by which the government in each country provides birth control assistance to their people also needs to be looked into. This is necessary in view of the recent controversy of people being coerced into sterilization in some countries. This practice if true is a violation of the freedom of choice of the individuals to decide if, when and how often to regulate their fertility as contained in the 1994 ICPD resolutions.

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