

CHAPTER 1.

A Comparative Study of Fertility Levels and Trends in Developing Countries

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1. INTRODUCTION

One of the most dramatic phenomena in recent demographic history of the world is a relatively rapid decline in fertility in some of the developing countries, notably in those of East Asia and the Caribbean. Two or three decades ago nobody envisaged such dramatic fertility declines in the less developed regions. On the other hand, however, in most of African and Middle Eastern countries, fertility is extremely high concomitant with their high infant and child mortality and appreciable fertility declines are yet to begin. Clearly, the developing world is not a monolith, but is characterized more by a diversity and even a polarization.

The fertility decline in developing countries has been confirmed among others by the outcomes of the Demographic and Health Surveys (DHS) and previous World Fertility Surveys (WFS). Since its initiation in 1984, the DHS have produced a series of invaluable statistical information which clearly demonstrates the increasing prevalence of family planning and decline in fertility in recent years among many developing countries.

The DHS Program was initiated in 1984 by the U.S. Agency for International Development (USAID). The objectives of the programme are: to provide survey countries with data and analysis useful for informed policy choices, to expand the international population and health data base, to develop in participating countries the skills and resources necessary to conduct demographic and health surveys, and to advance survey methodology. As of mid-1991, 36 surveys had been conducted in Africa, Asia, Latin America and the Caribbean under the DHS program. The program is ongoing and the phase-2 surveys for 22 countries will be completed by 1993.

Since this chapter is intended to be an introductory and overview chapter of the present volume, an attempt is being made to present a review of the current levels

and trends of fertility in developing countries and prepare some of the state of the art pertaining to the recent theories and hypotheses on determinants of fertility changes therein.

In general, demographers with the socio-demographic background have interpreted the process of demographic transition with an emphasis on non-economic factors.¹ According to them, the major thrust of recent fertility decline has not necessarily been generated by economic forces, including industrialization, increase in the level of income, increase in women's participation in labour force, but increasingly more so by social and cultural factors such as the spread of education, and legitimation and diffusion of the idea of family planning. Throughout the literature of studies derived from the WFS, Princeton University's European Fertility Project and the DHS, it has become increasingly clear that ideational factors have probably been much more important for influencing the spread of family planning and reduction of fertility in developing countries. That is to say that diffusion of ideas, knowledge and methods of family planning along with the line of cultural similarities has empirically been more consequential than economic forces exerting influences directly upon fertility.

In this chapter, after showing sweeping trends in fertility decline among developing countries, an effort is being made to explicate the process of fertility transition by referring to well-known studies made so far with particular reference to education and women's gainful participation.

Lastly, since Japan has completed a demographic transition from high birth and death rates to relatively low birth and death rates in a relatively short period of time and since it was the first country to complete the fertility transition among the non-western countries, the experience of Japan will be discussed with reference to its national fertility surveys with a tacit intention of obtaining useful implications for other Asian countries. In this connexion, the early rounds of fertility surveys

conducted by the Institute of Population Problems in the 1950s and 1960s would be useful for envisaging and designing fertility reduction in developing countries. The findings derived from the Japanese study seem to corroborate the importance of educational and ideational factors which have been known through WFS and DHS.

The studies carried out by Mauldin and others relating to the Population Council have repeatedly demonstrated that even if developmental factors are important in causing fertility decline, the government's volitional endeavor is at least equally effective in spreading family planning and reducing fertility. It has been noted by Mauldin and his associates that fertility declines are remarkable in the countries where the Government's strength in pushing population policies is at a crest and at the same time where there is considerable development attained in socio-economic setting.

2. FERTILITY TRENDS IN THE DEVELOPING COUNTRIES

Table 1 indicates the population size and components of change in major region of the world. This table clearly demonstrates how the present day developing regions stand demographically and how much fertility and mortality have declined during the past two decades. Birth rates in the world as a whole have declined by an average of 20 percent since 1965-69, while the total fertility rate, the average number of births to a woman who has completed childbearing, has declined by 30 percent. Only Africa fails to show widespread declines in birth rates. Fertility levels in every European and Northern American country, along with Japan and several other East Asian countries, have fallen below the replacement level, the level required in order to avoid a decline in size between successive generations.

Apart from a general statement, now let us turn more specifically to total fertility rates of developing regions and countries (Table 2). The decline obviously started out in the 1960s in Latin America, the Caribbean and East Asia, notably in the present Asian NIEs (Newly Industrializing Economies) including Taiwan, South Korea, Hong Kong and Singapore. The decline of fertility in East Asia is, however, blurred by the increase in China following the great famine occurred around 1960. Some countries of Latin America such as Brazil, Costa Rica, Panama and the Caribbean such as Puerto Rico, Barbados, Jamaica, Trinidad and Tobago and Cuba had experienced remarkable declines.

By the way, Temperate South American Countries of Argentina and Uruguay had been noted for their European-like low fertility pattern even in the 1950s. In

the 1970s the decline started out in some of South East Asian countries such as Thailand, Malaysia and Indonesia. It is interesting to witness that all of the above-mentioned Asian NIEs have attained the sub-replacement fertility. Those countries or territories are within the perimeter of what might be called Chinese-related culture using Chinese characters, chop sticks and religiously related to Confucianism. Mainland China has been approaching the replacement level of fertility through its strong family planning programmes. But, what is now more striking is that some of the countries outside the Chinese perimeter such as Thailand has been approaching the replacement level of fertility.

In many countries of Africa, however, fertility rates remained constant and high; they even increased slightly in some of them. Similar levels are found in the least developed countries located in Africa and Asia, where total fertility rates of 6.0 or more births per woman are not uncommon and where changes have been negligible. Consequently, for the past 10 years, Africa is the major area that has substantially increased its contribution to the average annual number of births (from about 17 to almost 20 percent of all births). Asia, despite significant reductions in fertility, still contributes about 60 percent per annum, the largest share of all births in the world. This situation prevails despite the increase in contraceptive use in most of the countries in the area because of its largest share in population size in the world population.

The fertility decline in the less developed countries as a whole was less in the most recent five-year period than in the two preceding decades. In large part the lesser rate of decline in recent years was a result of East Asia, where the fertility was already low decline fell in most recent period. The apparent slowdown in East Asia by the customary measure was a result of previous strong movement toward the replacement floor. However, it is of concern to policymakers that movement toward replacement fertility levels did slow down in most other regions of the world than East Asia in the period ending in 1980-85.

In the long run, however, the fertility in the developing world has substantially declined, notably in East Asia with the Asian NIEs and China, in many of Latin America, but not in Africa and Middle East. Some countries in the Indian Sub-Continent are at a cross-road. Sri Lanka, although it is in the Sub-Continent division, has shown a remarkable decline. India, a very important country because of its sheer population size, has been staggering despite of its government's foresight and efforts in reducing fertility through its active campaign for spreading family planning all over India, throughout different states, castes, ethnic, religious and linguistic groups. Bangladesh and Pakistan,

Table 1 Population Size and Composition of Change in Major Regions of the World, 1965-70 and 1985-90

	Population Size (millions)		Annual Growth Rate (%)		Crude Birth Rate (per 1,000)		Crude Death Rate (per 1,000)		Total Fertility Rate		Life Expectancy at Birth (for both sexes combined)	
	1970	1990	1965-70	1985-90	1965-70	1985-90	1965-70	1985-90	1965-70	1985-90	1965-70	1985-90
World	3,697	5,295	2.06	1.73	33.9	27.0	13.3	9.7	4.89	3.43	56.0	63.3
More developed regions	1,049	1,211	0.90	0.64	17.9	14.8	9.2	9.4	2.44	1.92	70.5	73.7
Less developed regions	2,648	4,084	2.54	2.08	40.5	30.7	15.1	9.7	6.01	3.90	52.0	60.7
Africa	363	643	2.65	2.95	47.4	44.5	21.0	14.9	6.73	6.25	44.0	51.7
Asia	2,102	3,118	2.44	1.85	38.5	27.5	14.2	8.9	5.69	3.45	53.5	62.9
Eastern Asia	987	1,351	2.43	1.39	34.7	20.5	10.4	6.6	5.40	2.30	60.6	70.3
South-eastern Asia	287	444	2.52	2.02	41.1	29.9	16.3	9.0	5.81	3.73	49.3	61.3
Asia	754	1,191	2.38	2.22	41.9	33.9	18.1	11.7	5.96	4.66	47.4	57.0
Southern Asia	74	132	2.77	2.78	42.8	35.2	15.4	7.9	6.32	5.04	53.3	64.6
Western Asia	469	509	0.67	0.38	17.7	12.8	10.3	10.4	2.50	1.71	70.7	74.4
Europe	283	441	2.58	1.96	38.0	27.9	10.9	7.3	5.52	3.40	58.9	66.5
Latin America	226	277	1.13	0.96	18.0	15.9	9.3	8.6	2.54	1.89	70.5	75.2
Northern America	19	27	1.98	1.64	24.5	19.5	10.2	7.9	3.55	2.52	65.5	71.5
Oceania	236	281	1.00	0.84	17.9	18.9	7.8	10.1	2.42	2.43	69.3	69.1
USSR (Former)												

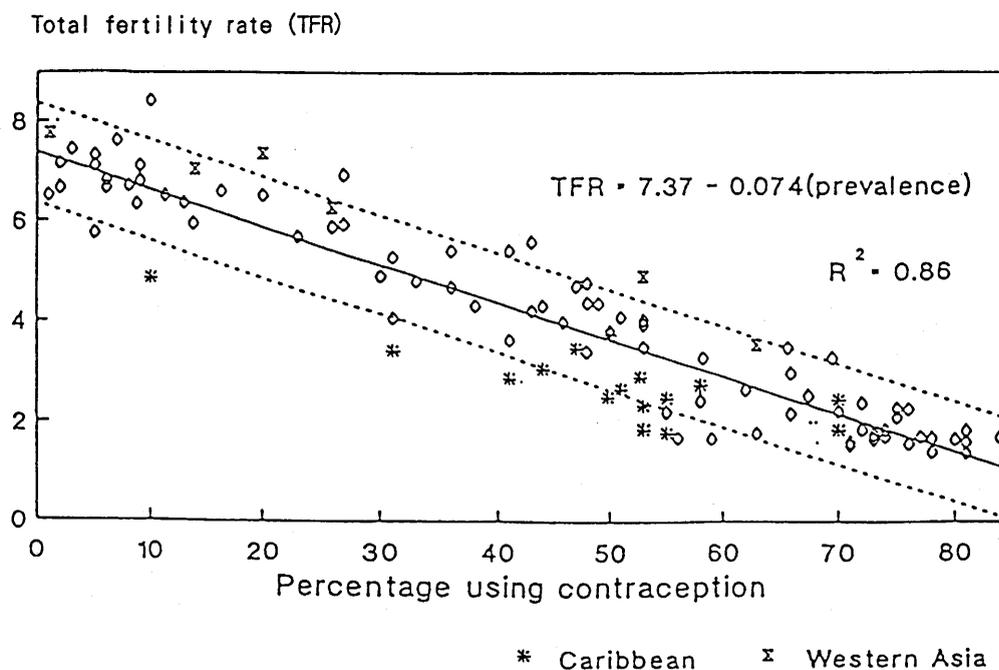
(Source) United Nations, *World Population Prospects: The 1992 Revision. Annex Tables, New York, 1992.*

Table 2 Total Fertility Rates by Major Areas and Major Countries of Less Developed 1950-1990: Medium Variant of the United Nations Projections

Major Area and Major Country	1950-55	1955-60	1960-65	1965-70	1970-75	1975-80	1980-85	1985-90
World Total	5.00	4.88	4.98	4.89	4.46	3.84	3.64	3.43
More Developed Regions	2.83	2.82	2.69	2.44	2.21	2.00	1.93	1.92
Less Developed Regions	6.19	5.95	6.09	6.01	5.41	4.55	4.23	3.90
Africa	6.65	6.74	6.79	6.73	6.62	6.55	6.40	6.25
Asia	5.93	5.57	5.71	5.69	5.07	4.07	3.77	3.45
Eastern Asia	5.72	4.96	5.35	5.40	4.40	2.79	2.44	2.30
South-eastern Asia	6.03	6.08	5.90	5.81	5.32	4.82	4.20	3.73
Southern Asia	6.11	6.09	6.03	5.96	5.76	5.28	5.16	4.66
Western Asia	6.81	6.68	6.54	6.32	5.98	5.58	5.33	5.04
Europe	2.59	2.59	2.62	2.50	2.19	1.98	1.81	1.71
Latin America	5.88	5.90	5.95	5.52	4.98	4.37	3.92	3.40
Caribbean	5.21	5.13	5.46	5.01	4.37	3.49	3.18	2.96
Northern America	3.47	3.72	3.34	2.54	2.01	1.78	1.80	1.89
Oceania	3.83	4.06	3.94	3.55	3.22	2.81	2.62	2.52
USSR (former)	2.82	2.81	2.54	2.42	2.44	2.34	2.35	2.43
Major Country of LDC								
Ethiopia	6.70	6.70	6.70	6.70	6.80	7.00	6.50	7.00
Kenya	7.51	7.82	8.12	8.12	8.12	8.12	7.50	6.80
Egypt	6.56	6.97	7.07	6.56	5.53	5.27	5.06	4.53
Zaire	6.00	6.00	6.00	6.10	6.30	6.50	6.70	6.70
China	6.24	5.40	5.93	5.99	4.76	2.90	2.52	2.38
Rep. of Korea	5.18	6.07	5.40	4.52	4.11	2.80	2.40	1.73
Indonesia	5.49	5.67	5.42	5.57	5.10	4.68	4.05	3.48
Bangladesh	6.66	6.62	6.68	6.91	7.02	6.66	6.15	5.10
India	5.97	5.92	5.81	5.69	5.43	4.83	4.73	4.20
Pakistan	6.50	6.80	7.00	7.00	7.00	7.00	7.00	6.75
Thailand	6.62	6.42	6.42	6.14	5.01	4.27	2.96	2.57
Turkey	6.85	6.54	6.11	5.62	5.04	4.51	4.10	3.79
Barbados	4.67	4.67	4.26	3.45	2.74	2.19	1.92	1.62
Cuba	4.10	3.68	4.67	4.29	3.55	2.10	1.85	1.83
Mexico	6.75	6.75	6.75	6.70	6.37	5.03	4.29	3.60
Argentina	3.15	3.13	3.09	3.05	3.15	3.36	3.15	2.96
Brazil	6.15	6.15	6.15	5.31	4.70	4.21	3.81	3.20

(Source) United Nations, *World Population Prospects 1990*. Revision, New York, 1992.

Figure 1. Total fertility rate by contraceptive prevalence, 104 countries



(Source) United Nations, 1991. *World Population Prospects 1990*, Sales No. E. 91, X III. 4 (New York).
Directly adapted from Weinberger, 1991.

two big countries in terms of population, have still considerable difficulties in the nations as a whole to make breakthrough for starting a visible fertility decline. In these countries religious factors are detrimental to the cause and there remain still great demands at the family and community levels for high fertility because of the prevalence of high child mortality and because of the existence of labour-intensive agriculture which calls for young labour force but without adequate social security system, which would provide substitution for the family support for old parents.

3. CONTRACEPTIVE PREVALENCE

The level of fertility is strongly related to contraceptive prevalence (Figure 1). It is remarkably so, considering that the level of contraceptive use is only one of several major proximate determinants of fertility (Weinberger, 1991).

As shown in Table 3, estimates of contraceptive prevalence by method are presented for the world and regions by the United Nations. Fifty-three percent of the world's couples are estimated to be using contraceptives. The main methods are surgical sterilization, adopted by 20 percent of couples, intra-uterine, devices (IUDs), practiced by 11 percent of couples, and oral pills used by 7 percent of couples. Among the less developed countries, 48 percent of all the couples are estimated to be using contraceptives and a greater majority of users (44 percent of all the couples) use "modern methods" including sterilization, 18 percent for females and 5 percent for males, 12 percent for IUDs and 5 percent for pills (Weinberger 1991).

Africa is the only major region where the level of use remains low in a majority of the countries. The average level of use is estimated to be a moderate 31 percent in Northern Africa, but only 13 percent in sub-Saharan Africa. Of 22 sub-Saharan countries with data available, 10 percent of couples or less are using any type of contraception in over half of countries, and in over two-thirds of countries, under 5 percent of couples are using the relatively effective clinical and modern methods.

Among the developing countries, East Asia has by far the highest level of use, 72 percent, which is essentially the same as the average prevalence in the more developed regions. Again, Table 3 indicates average prevalence of specific contraceptive methods by region. In Latin America, the average prevalence is estimated to be 57 percent. Most countries of that region have reached at least a moderate level of contraceptive use.

Practically the same levels and trends of contraceptive use have been reported by Mauldin (Mauldin 1991).

During the 1980s the number of married women of reproductive ages in developing countries increased by more than one-third, and there will be an even larger numerical increase during the 1990s. During the 1980s the number of countries adopting policies to lessen population growth continued to grow, and the strength of family planning programmes increased far more than was the case during the 1970s. According to Mauldin the number of contraceptive users increased by about 160 million, from 220 million to 380 million during the 1980s, and it was projected that the number of contraceptive users would continue to increase rapidly, so that there would be an estimated 567 million users in the year 2000.

Table 4 indicates use of contraceptives and role of private sector for selected Asian countries, mostly for Asian NIEs (Ross and David, 1991). This table shows, the proportion of contraceptive uses of each method who rely on the public sector and those proportions of couples using each method. The highest proportions are for male and female sterilization, as well as for the IUD. They tend to be less for pill and condom.

If a perusal is made at the contraceptive prevalence, one can be surprised that in these countries a hefty percentage of the couples particularly females use IUD and resort to sterilization. In both cases, they overwhelmingly rely on public sector. How is it to be interpreted? The role of government is evident: in the past it has promoted family planning for the purpose of declining birth rate and reducing the family size in each house.

The extremely high rate of use of method relying on the public sector is the vestige of the past family planning activities. As compared to Japan, for example, the rate has been very high of use of more "modern" and effective method such as pill and sterilization. But in the future prospect, the transition is expected to occur from the clients' reliance up on the public sector to that upon the private sector (Ross and David, 1991).

4. SOME SUCCESS OF FAMILY PLANNING IN POOREST SETTING

In recent years, some success has evidently been noted in the Matlab region of Bangladesh and Chogoria in Kenya through a very systematic way of practice in campaigning and teaching family planning (Freedman, 1990; Goldberg, McNeil and Spitz, 1989).

The success in the spread of family planning in the Matlab district is an outcome of the labour-intensive efforts of door-to-door family planning delivery which is provided largely by educated and trained women drawn from the elite group (Koenig, et al, 1987; Menken and Philips, 1990). This gives a strong implication that even

**Table 3 Average Prevalence of Specific Contraceptive Methods, by Region
(Based on Most Recent Available Survey Data: Average Data 1987)**

Region	All methods (1)	Modern methods (a) (2)	Sterilization Female (3)	Sterilization Male (4)	Pill (5)	Inject- able (6)	IUD (7)	Condom (8)	Vaginal barrier methods (9)	Rhythm (10)	With- drawal (11)	Other methods (12)
A. Percentage of couples with the wife in the reproductive ages												
World	53	44	16	4	7	1	11	5	1	4	4	1
More developed regions (b)	71	47	8	4	14	-	6	13	2	9	13	2
Less developed regions	48	44	18	5	5	1	12	3	0.3	2	1	1
China	72	71	28	8	3	0.2	30	2	0.3	0.5	-	0.3
Other countries	38	32	14	3	6	1	4	3	0.3	3	2	1
Africa	17	13	1	-	7	1	3	1	0.2	2	1	1
Northern Africa	31	27	2	-	16	0.3	8	1	0.3	2	2	1
Sub-Saharan Africa	13	9	1	-	4	2	1	0.5	0.2	2	1	1
Asia and Oceania (c)	53	49	21	6	4	1	14	3	0.3	2	1	1
East Asia (c)	72	71	28	8	3	0.2	29	2	0.4	1	0.2	0.3
Other countries	40	34	16	5	4	1	4	4	0.3	2	2	2
Latin America	57	47	20	1	16	1	6	2	1	5	3	1
B. Percentage of contraceptive users												
World	100	83	29	8	14	2	20	9	1	7	8	2
More developed regions (b)	100	66	11	6	20	-	8	18	3	13	19	2
Less developed regions	100	91	37	9	11	2	25	5	1	4	3	2
China	100	99	38	11	5	0.3	41	3	0.4	1	-	0.4
Other countries	100	84	36	8	16	4	12	8	1	7	5	4
Africa	100	79	9	-	40	8	18	4	1	9	5	6
Northern Africa	100	88	6	-	51	1	25	4	1	5	5	2
Sub-Saharan Africa	100	70	11	-	28	16	10	4	1	13	6	11
Asia and Oceania (c)	100	92	39	11	7	2	27	6	1	3	2	2
East Asia (c)	100	98	39	11	5	0.3	40	3	1	1	0.2	0.4
Other countries	100	85	39	11	11	4	11	9	1	6	5	4
Latin America	100	84	36	1	28	2	11	4	1	9	6	2

(Note) These estimates reflect assumptions about contraceptive use in countries with no data
a Includes methods in columns (3) through (9).
b Australia-New Zealand, Europe, North America and Japan.
c Excluding Japan.

(Source) United Nations, 1991. *World Population Prospects 1990*.

Table 4 Percent of Contraceptive Users of Each Method Relving on Public Sector

	All methods	IUD	Orals	Inject- able	Female Sterili- zation	Male Sterili- zation	Condom	Other	Condom/ Other
China									
1988	100	100	100	100	100	100	100	-	-
Hong Kong									
1982	64	55	60	22	100	100	42	56	-
Korea									
1980	54	94	51	-	68	92	U	9	9
1985	56	58	19	-	83	83	15	U	6
1988	61	60	12	-	86	87	13	U	U
Singapore									
1978	75	67	82	-	95	100	U	U	55
Taiwan									
1986	74	86	89	-	86	70	68	U	U
Thailand									
1987	82	95	70	85	91	66	50	-	-
Contraceptive Prevalence: Percent of Couples Using Each Method									
China									
1988	72	30	3	0	28	8	2	1	-
Hong Kong									
1982	78	4	21	-	3	21	1	16	12
Korea									
1980	55	10	7	2	15	6	12	5	-
1985	70	7	4	-	32	9	7	11	-
1988	77	7	3	-	37	11	10	9	-
Singapore									
1978	71	3	17	-	21	1	U	29	-
Taiwan									
1986	75	24	6	-	23	2	12	7	-
Thailand									
1987	67	7	20	9	22	6	1	2	-

(Source) Ross, Jhon A. and David P. Smith 1991. "Concepts, goals, and strategies for program formulation".

in the poorest conditions which are normally inimical to the widespread practice of family planning and the substantial decline in fertility, family planning can be accepted and favourably practiced by the population. This means that if the quality of services is high enough, the high prevalence of family planning is feasible under the least developed and poorest economic settings.

By and large, for many years it had been considered that the development is the best contraceptive, that is to mean that a fertility decline is made possible only if the demand for small family arises in accordance with the reduction in infant mortality, the rise in cost of raising and educating children and the decline in money values of children. Those changes in economies are considered to be outcome of industrialization and development. But the Matlab experiment indicates that even if some of the developmental variables are not well-developed, if there are strong will and efforts of the government to reduce population growth rate, it is not impossible for a country to reduce the fertility and spread the idea and methods of family planning in poor developmental conditions.

Of course, the Matlab experience is not without suffering from criticisms against it. After all, one can say that the Matlab programme is only an experimental case by spending an excessive amount of manpower and money. In the poor societies that are not fully convinced about the need for contraception, there should be many other conditions necessary for maintaining the prevalence rate thus achieved and for further increasing it. Certainly in the case of Matlab, a full use of an well-trained cadre of female elites, well-educated and from good families, has facilitated to cultivate motivation and provide legitimation of family planning among the population which is entirely rural and not terribly high in education—only 30 percent literate and educational levels being below the national average. Without such a cadre of good service workers, it would be difficult to repeat a similar programme in a sub-Saharan area.

Another question is that the case of Matlab demonstrates that contraception must be available in a village and efficient delivery of services must be secured (Caldwell and Caldwell, 1992). Again, in many developing countries, particularly in sub-Saharan countries the basic infrastructure is weak, and there is a severe shortage of professional personnel (Freedman, 1990). Hence, it would not be possible to cover the entire country even if successful in a particular small area.

Thirdly, the efficient delivery of services alone cannot intensify motivation and legitimation among the people. True, Bangladesh is known for its relatively low desired family size. Yet, there are some limits beyond which it is difficult to cultivate motivation without

concomittant social development. Even in the Matlab case, prevalence rates quickly peaked in the first three months of contraceptive distribution and then declined steadily (Stinson et al. 1982). Hence there are needs for continuously reinforcing.

Nevertheless, cases such as Bangladesh and Kenya, which go against the conventional wisdom, deserves particular attention, because they may help us to strengthen the theories on which our prognoses and policies ultimately depend (Freedman and Blanc, 1991). In a particular reference to the Matlab case, the experiment produced a sharp reduction in fertility is a decisive indication that there were preexisting but unrealized desires to reduce fertility and that supply factors can influence fertility outcomes (Preston, 1990).

5. FACTORS AFFECTING FERTILITY DECLINES IN DEVELOPING COUNTRIES

A great number of studies have so far been conducted in the world, by demographers both in developed and developing countries. The aim of their studies is not merely of the academic interest in and recognition of what has happened in the developing countries, but it is because demographers would like to utilize the knowledge and experience obtained through past researches with the WFS and DHS for the remaining area of the developing world. In other words, they would like to draw lessons and research implications as to how the society and economy of a country has changed and as to how people respond to the changing in socio-economic structure. The knowledge of why the Asian NIEs has achieved the below-replacement fertility would have great impacts upon the academic world of status quo.

For many years, many demographers conceived that fertility could decline only if developing country has achieved a certain threshold of economic and social development. When Ronald Freedman spoke at the time of the 1964 World Population Conference at Belgrade, his assumptions were entirely new (Freedman, 1966).

The assumptions were that fertility rates ought to decline first and most rapidly under the following conditions:

- (a) Where significant social development has already occurred;
- (b) Where mortality has been relatively low for some time;
- (c) Where there is evidence that many people, wanting moderate sized families, are beginning to try to limit family size;
- (d) Where there are effective social networks, transcending local communities, through which family planning ideas and services and other

modernizing influences can be disseminated;

(e) Where there are large-scale, effective organized efforts to disseminate family planning ideas and information;

(f) Where such new contraceptives as IUDs or contraceptive pills are effectively available.

Then Freedman maintained that it is not necessary to assert that all of these are necessary preconditions for any fertility decline.

Nearly thirty years have elapsed since he formulated the above-mentioned new paradigm, nobody now casts doubt about the efficacy of policy elements. It has already demonstrated in a sufficient number of cases that fertility in developing countries could decline even if it lacks the well-developed economic and social development. As already mentioned, between 1960-65 and 1985-90, the United Nations estimates that the total fertility rate in less developed regions declined by 35 percent, from 6.1 to 3.9 births per woman. During the period their contraceptive prevalence—the percentage currently using contraception among the couples with the women of childbearing age—grew from a level that was probably under 10 percent before 1965 to 48 percent as indicated by recent surveys. Weinberger estimates that given recent trends, contraceptive prevalence in developing countries probably exceeds 50 percent in 1991.

Mauldin and his associates have attempted several times macro analyses of the correlates of fertility declines in developing countries for past periods 1960-65 to 1990 during which time there were substantial fertility declines in Asia, Latin America and some in North Africa, and almost negligible in sub-Saharan Africa. The analysis focuses on how much of the fertility decline is associated with such socio-economic variables as health, education, economic status and urbanization, or with "modernization" as a whole and how much is associated with population policies and programmes, primarily family planning programmes designed to reduce rates of growth.

The data were examined in a variety of ways: simple correlations among the variables; multiple regression analyses using both values of socio-economic variables; exploratory data analyses; relation of socio-economic level and programme efforts to both absolute and percentage declines in fertility; and cross-tabulation of programme efforts with an index of socio-economic variables.

The first analysis was done by Mauldin and Berelson in 1978. Such data and analyses showed that the 1978 level of "modernization" as reflected by seven socio-economic factors has a substantial relationship to fertility decline, but also that family planning programmes have a significant, independent effect over and above the

effect of socio-economic effect. The key finding probably is that the two—social setting and programme effort—go together most effectively. Countries that rank well on socio-economic variables and also make substantial programme efforts have on average much more fertility decline than do countries that have one or the other, and far more than those with neither.

Each time Mauldin and his associates, Bernard Berelson, John Bongaarts, James F. Phillips, Robert J. Lapham or John Ross, have reached similar conclusions out of similar approach but each time utilizing new and up-dated data. The most recent one was published in 1991 with John A. Ross. In this paper Table 5 reproduces their famous table concerning declines of total fertility rate during 1982-89 among developing countries, by social setting in 1985 and programme effort level in 1989.

In the 1991 study, Mauldin and Ross (1991) show the graphic presentation of path analysis below, the arrows indicate the assumed direction of effect (Diagram).

According to the result of this path analysis, programme effort has a stronger direct effect on TFR decline (0.64) than do the socio-economic variables (0.29). However, this understates the total effect of the socio-economic variables inasmuch as they also operate through programme effort. Their indirect effect on fertility decline is the product of the path from social setting to programme effort and of programme effort to TFR decline ($0.82 \times 0.64 = 0.52$). Hence, the total effect of social-economic score is $0.29 + 0.52$ or 0.81.

Finally, Mauldin maintains that the availability of modern contraceptive methods has become important. It appears to have acted as a necessary condition for substantial fertility declines in today's developing country settings.

6. ASSESSMENT OF THE WORLD FERTILITY SURVEYS IN REGARD TO THE CAUSES AND CONDITIONS OF FERTILITY DECLINE

It was already mentioned that declines in fertility in the developing countries have been caused by a wide variety of determinants under different backgrounds. One of the major findings of the World Fertility Survey is that determinants of recent fertility decline are better explained by diffusional effects of family planning programmes rather than the transformation of socio-economic conditions, though without the initial socio-economic development it is difficult to envisage to have a start of the decline.

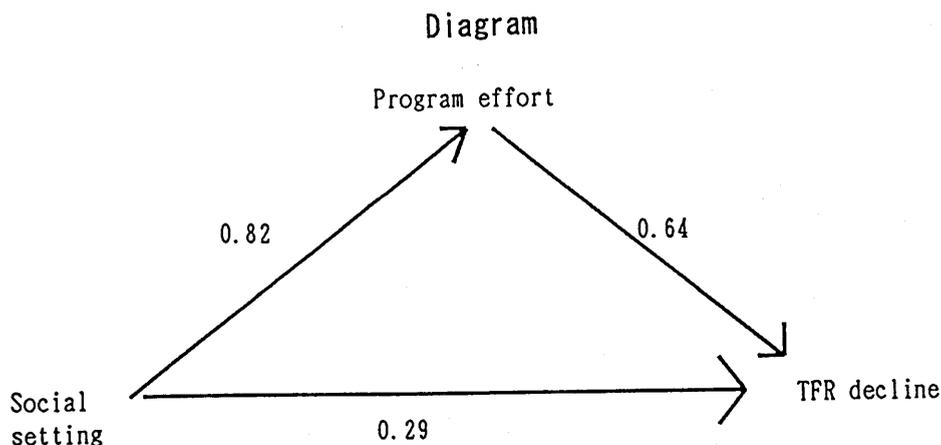
Increasingly a larger number of scholars in population sciences have taken the stand which emphasizes the importance of ideational factors affecting fertility (Lesthaeghe, 1983; Lesthaeghe, 1992). The European

Table 5 Absolute Decline in Total Fertility Rate, 1960-65 to 1990, by Social Setting in 1985 and Average Program Effort Level in 1982-89

	Strong		Moderate		Weak		Very weak or none		Mean	
	Country	Absolute decline	Country	Absolute decline	Country	Absolute decline	Country	Absolute decline		
High	Mauritius	3.8	Colombia	3.7	Costa Rica	3.8	Kuwait	3.7	3.0	
	South Korea	3.7	North Korea	3.3	Brazil	2.8	Iraq	1.0		
	Taiwan	3.7	Jamaica	3.1	Lebanon	2.8				
	Mexico	3.4	Panama	2.9	Venezuela	2.8				
	Singapore	3.1	Cuba	2.8	Jordan	2.2				
			Chile	2.6						
			Trinidad and T.	2.2						
		(3.5)		(2.9)		(2.9)		(2.3)		
Upper middle	Thailand	4.0	Dominian Rep.	3.8	Guyana	3.6	Libya	0.4		2.2
	China	3.6	Tunisia	3.4	Peru	3.1	Saudj Arabia	0.1		
	Sri Lanka	2.6	Malaysia	3.0	Turkey	2.6				
	Indonesia	2.1	Ecuador	2.8	Iran	2.3				
			Egypt	2.8	Paraguay	2.3				
			Philippines	2.5	Algeria	2.2				
			El Salvador	2.2	Zimbabwe	1.9				
			Botswana	0.2	Guatemala	1.3				
					Syria	1.0				
					Congo	0.3				
		(3.1)		(2.6)		(2.0)		(0.3)		
Lower middle	India	1.6	Vietnam	2.1	Morocco	2.6	Myanmar	2.1	0.7	
					Honduras	2.1	Cambodia	1.7		
					Haiti	1.4	Bolivia	0.7		
					Kenya	1.2	Ivory Coast	-0.1		
					Papua New Guinea	1.2	Liberia	-0.1		
					Pakistan	0.8	Laos	-0.5		
					Chana	0.6				
					Madagascar	0.1				
					Nigeria	0.1				
					Lesotho	0.0				
					Zaire	-0.1				
					Tanzania	-0.2				
					Central African Republic	-0.5				
					Zambia	-0.6				
					Cameroon	-1.0				
		(1.6)		(2.1)		(0.5)		(0.6)		
Low			Bangladesh	1.4	Senegal	0.7	Sudan	0.3		0.0
			Nepal	0.1	Afghanistan	0.2	Chad	0.2		
					Burkina Faso	0.1	Mauritania	0.0		
					Mozambique	0.1	Somalia	0.0		
					Burundi	0.0	Benin	-0.1		
					Guinea	0.0	Ethiopia	-0.1		
					Mali	0.0	Malawi	-0.6		
					Niger	0.0				
					Togo	0.0				
					Sierra Leone	-0.2				
					Uganda	-0.4				
					Rwanda	-0.5				
					Guiea-Bissau	-0.7				
				(0.7)		(0.0)		(0.0)		
Mean		3.2		2.5		1.0		0.5	1.4	

(Note) Mean were calculated by unit weights. Mean absolute decline in total fertility rate in each cell is shown in parentheses. Negative entries indicate arise in the TFR.

(Source) W. Parker Mauldin and John A. Ross. "Family planning programs: Efforts and results, 1982-89", Working Papers(Population Council). No.34.



fertility study carried out by the Princeton University group told us that the onset of demographic change is more closely associated with parents' education and cultural affiliation than with economic factors, such as familial control of economic life or women's employment (Coale and Watkins, 1986). On the basis of the WFS studies, Cleland and Wilson made a summary on current studies of the determinants of fertility in developing countries that declines in parents' demand for children (as indicated by survey data on preferences) do not appear to precede fertility transition, nor are fertility aspirations markedly lower in more modern sectors, except in Africa (Cleland and Wilson, 1987).

After an extensive review of the literature on fertility declines in the developing countries so far accumulated before 1987, Cleland and Wilson concludes that in the process of fertility decline in the developing countries, non-economic factors have been playing a more influential part:

The probable importance of ideational rather than structural change is our most significant conclusion. This conclusion is supported by a number of strands in the evidence: the weak links at either macro- or micro-level between economic structure and fertility; the stronger links with culture and education, both of which are likely to determine the initial acceptability of new ideas; and the quick spread of birth control within many societies. We were also influenced by the massive scale and force of the flow of new knowledge and values from the industrialized to the developing world, which impinge upon political, economic and social life alike. It is surely no coincidence that in those parts of the world that have withstood this onslaught by design (e.g. much of the Islamic world), by the strength of indigenous culture, and its incompatibility with Western values (e.g. the Indian sub-continent) or by relative isolation (e.g. Africa), fertility transition has yet to occur, or has only a tenuous foothold (Cleland and Wilson, 1987).

7. ROLE OF EDUCATION

Two factors which have been considered salient in contributing to reduce fertility in developing countries are traditionally women's education and employment outside their home. Rodriguez and Aravena pointed out that demographic changes that swept Asia and Latin America in the 1960s and 1970s has now stretched towards North and sub-Saharan Africa and there is a clear evidence that the first group adopted limiting behavior in each country are the women living in urban and metropolitan areas who have completed primary education and who are married to white-collar workers (Rodriguez and Aravena 1991). One point is clear that

once the transition gets underway, however, it appears to be only a matter of time before it spreads to other strata in society, in a self-sustaining process of diffusion.

Recent reviews on the determinants of fertility have concluded that the inverse relation between education and fertility is one of the most consistent and best documented in the literature (Cochrane, 1979; Weinberger, Lloyed and Blanc, 1989). However, its effects vary differentially in urban and rural areas, between male and female education, in different literacy levels.

The World Fertility Surveys furnish an opportunity to explore the relationship between education and fertility using comparable data from a wide variety of settings in countries with varying levels of educational attainment and fertility. The proportion of women with no schooling ranges from two to 98 percent in the 38 countries included in the WFS surveys while the proportion with ten or more years of schooling ranges from zero to 24 percent.

The WFS and DHS also indicate strong associations between education and fertility. In all countries surveyed, educated women marry later, have fewer children (and therefore spend fewer years caring for young children not yet of school age) and are much more likely to practice modern contraception (Weinberger, Lloyd and Blanc, 1989).

Most studies that have tried to determine the effect of family planning programmes on fertility have found that programme effort does have an effect above and beyond that of a society's general level of development. Tentative evidence presented here indicates that programmes can also influence the size of educational differentials in contraceptive use by speeding the diffusion of contraceptive practice.

In sum, educational differentials in fertility were pervasive in developing countries during the late 1970s and early 1980s. Fertility differentials are often large, and in most cases appear to be widening. The view adopted here is the instances of very wide differentials probably reflect the early stages of transition to lower, deliberately controlled fertility.

According to Caldwell (1982), there are five ways in which education acts:

1. It reduces the child's potential for work inside and outside home, because of the absence of the child from the family and home industries while at school.
2. It increases the cost of children for fees, uniforms and stationery, etc.
3. Education indoctrinates rational way of thinking.
4. Schooling speeds up cultural change and imposes middle-class value; these include having few children but ones in which heavy investment is made.

5. More specifically, in the contemporary world the school serves as the means for propagating the specific values of the Western middle class and transmitting the idea and knowledge of family planning. These include the view that girls are as important as boys, and just as much to be educated, that white collar work is better than farming, etc.

It should be recognized that the effect of education is not universally appreciable, and hence is non-linear. It differs largely contingent upon the degree of development, industrialization and modernization. By and large, however, education seems to be most ubiquitous conditions and higher educational attainment is usually associated with lower fertility.

8. WOMEN'S EMPLOYMENT

It is widely recognized that women's work and fertility are interdependent. Because children absorb a mother's time and also require other resources, a mother's work represents both a constraint on their rearing and a productive resource for their support. Whether women's participation in economic activity increase or decrease with the arrival of additional children will, therefore, depend on the particular mix of opportunities available (Lloyd, 1991). There is the huge stock of literature in the linkage between the women's increasing role in industrial society and reproductive behaviour. Numerous studies have shown an inverse relationship between family size and the extent of female participation in economic activity; *i.e.*, married women who are gainfully employed generally have fewer children than other married women. This relationship has been found to be more marked in the industrialized than in the non-industrialized countries, and in urban areas more than that in rural areas. Moreover, it is the women who work for wages, rather than the self-employed or unpaid family workers, that have significantly lower fertility than non-working women (United Nations, 1973; Davis, 1984; Fuchs, 1988; Mincer, 1985).

As already mentioned, particularly in developing countries the relationship is not very straightforward. In the long perspectives, fertility changes in accordance with an increase in women's employment underlined by economic and social development, but in the short run the association is sometimes not evident. Figure 2 indicated the trend of economic activity rate for females aged 20-39 in comparison with the trend of total fertility in Japan. It is clear from the figure that while total fertility rate has remarkably declined between 1950 and 1990, the proportion of employed persons has increased only moderately in the long run and it rather decreased between 1960 and 1975. If the proportion of employees

is taken instead, the indicator excluding the self-employed and family workers, then it shows a substantial rise in the secular trend between 1950 and 1990, but with several minor anomalies found in the short runs.

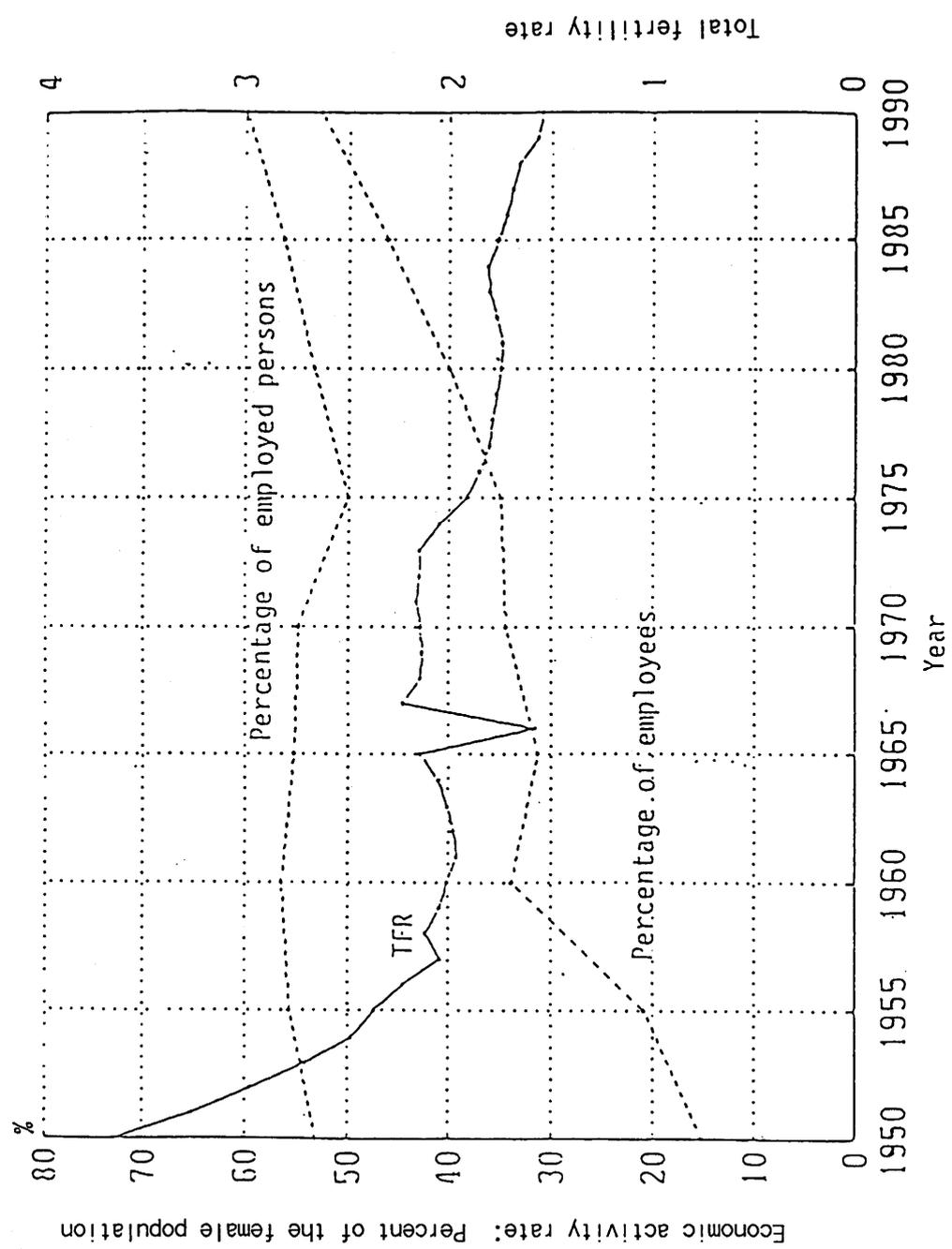
At the micro level of analysis, the interrelationship is also complicated and even sophisticated methods do not bring very straightforward findings (Waite and Stolzenberg, 1976; Lloyd, 1991). It seems that a clear inverse relationship between women's work and fertility may considerably be modified and may not become unambiguous, depending on the availability of full-fledged child care system and related child-supporting institutions in some countries.

The study of trends in labour force participation is greatly complicated by the fact that definitions vary between countries and over periods of time. There is a particular need to caution against inter-country and temporal comparisons with regard to female employment, since women's contribution to the total amount of work done in a society is generally underestimated, but to varying degrees. First, housework is not included, but also other kinds of unpaid work has frequently been left out of population censuses and labour force surveys. As women have traditionally had an important function as unpaid family workers, especially in agriculture and small-scale family enterprises, a decline over time in the primary sector combined with a successive increase in industrial or tertiary employment would tend to underestimate the growth of female economic activities in the long run.

Traditionally, the pattern of female labour force participation in the developed countries has been called "M-shaped age distribution". That is to say, a large proportion of unmarried girls work as labour force, but they retire from the economic activity when they get married or before they deliver their first or second birth. This was a common trend observed in most of the industrialized countries until quite recent years. Now, increasing numbers of women, even got married, stay in the labour force, partly because there are more market opportunities for gainful work with a larger remuneration outside the home in accordance with the development of what might be called "soft industries", without resorting to the production process of heavy, dirty, difficult and dangerous operations, partly because the women work outside has now become recognized by the society as rather normal behavior, and partly because there are increasingly more facilities and institutions available outside for rearing children while women are away from home.

In the case of developing countries, the female labour force participation rate is notably lower than that in the developed countries and the age pattern is more flattened and like Ayer's rock in Australia. But there is

Figure 2. Percentage of Employed Persons and Percentage of Employed among the Female Population Aged 20-39 in Comparison with Total Fertility Rate in Japan: 1950-1990



(Source) Japan Bureau of Statistics, Management and Coordination Agency. Population censuses for each quinquennial year starting in 1950.

a tendency that the age profile is getting quickly the "M-shaped" distribution in the developed countries.

9. JAPANESE EXPERIENCE IN THE EARLY TRANSITIONAL PERIOD

The Institute of Population Problems conducted a national fertility survey in 1940. This was probably the first "national" fertility survey ever taken in the world. The well-known Indianapolis study which took place immediately after the war obviously did not cover the entire area of the United States, but only the city of Indianapolis (Kiser and Whelpton, 1958). The early series of the fertility surveys dealt mainly with the levels and differentials of fertility. Nevertheless, these surveys provide some useful data on event history of fertility and birth intervals for marriage cohorts by some socio-economic characteristics. These data afford us to look into cohort analysis of women according to year of marriage for the earlier years of the postwar period. Accordingly, those enable us to trace the fertility decline at the time when a full swing of fertility transition had started out in the postwar decades of the 1950s and 1960s.

At any rate, the 1940 and subsequent postwar surveys correspond nicely to the stages where Japanese society underwent an early phase of demographic transition, hence the results of the surveys should evoke academic interests among demographers who have noticed demographic transition occurring in many developing countries today.

Tables 6 and 7 are the summary tables which were rearranged by Aoki and Nakano (Aoki and Nakano, 1967). Table 6 shows fertility levels by education of husband and wife. Table 7 indicates those by occupation of husband and the general level of living. Both tables permit us to make a time-series comparison among the first (1940), second (1952), third (1957) and fourth (1962) fertility surveys. Even this type of simple tables signifies interesting patterns.

One of the salient findings derived from a cursory analysis of Tables 6 and 7 is that fertility differentials were greatest among different groups of educational attainment. On the other hand, however, different occupational groups did not show very clear-cut differentials among the couples. A similar pattern of indifference was observed also in the general level of living. From this observation, it is considered that even though economic traits of the families are different, the differences do not necessarily mean to cause fertility differentials. But when educational status has been changed, substantial differentials would appear.

Watanabe of the Institute of Population Problems has recently made an interesting study of the marriage cohort histories on the basis of both the 1952 national

fertility survey and the 1972 national fertility survey (Watanabe, 1992). Particularly the year of 1952 marks the stage where the nation's fertility massively started to decline in postwar Japan. The 1952 fertility survey provides the data on the marriage cohorts of 1905-14, 1915-24, 1925-34 and 1935-44. On the other hand, the 1972 fertility survey offers the data on marriage cohorts of 1945-49, 1950-54, 1955-59 and 1960-67. An attempt was then made to construct the fertility tables according to marriage duration, husband's educational attainment, agriculture or non-agriculture, related occupational activities and class of workers.

One may ask why the intermediate surveys have not been taken between the 1952 and 1972. The reason is simple. There are neither data files nor records left. For some reasons or others, the original questionnaire forms were long before abandoned. For the 1952 and 1972 surveys, the original questionnaire forms filled out had luckily been kept in a good condition permitting us to put them in data files and hence retabulate them.

It should be pointed out in this connexion that until the 1970s in Japan the fertility analysis means that of completed fertility which may be classified by various socio-economic status, but the temporal aspects of fertility, even truncated, had not been carefully studied. In the present analysis, an attention has already been made to quantify the length of birth interval according to parity of a marriage cohort and according to education and occupation of husband. If an observation is made of birth intervals of various cohorts, particularly high order of parity, then it enables to find out at which stage of parity, progression ratio was lessening and birth interval was lengthening among educational and occupational groups. That is to say, we could indentify when and where there were efforts of postponing or stopping births.

It is particularly noted in Tables 8 and 9 that marriage cohorts of 1915-24 and 1925-34 exhibit different childbearing patterns as compared with the previous cohorts of 1905-14 in regard to parity-specific Q (quintum) that is similar to the concept of parity progression ratio in life table-like presentation. More specifically, it is of note that the Q-value had remarkably been reduced in a cohort progression from parity 3 to 4, and 4 to 5, particularly remarkable among the high and medium educational groups. On the other hand, there were reductions not so large enough between the groups of agricultural and non-agricultural occupations. Q-values in lower parities do not show such substantial changes.

As a next step, comparisons are made of T, tri-mean of birth intervals in terms of months. Tables 10 and 11 show those birth intervals for the same characteristics of husbands. Tables 12 and 13 indicate the

Table 6 Number of Ever Born Children per Couple with Completed Reproduction by Both Husband's and Wife's Education in Past National Fertility Surveys

Educational Level of Husband	1940 Survey		1952 Survey		1962 Survey	
	No. of Couples	No. of Children per Couple	No. of Couples	No. of Children per Couple	No. of Couples	No. of Children per Couple
Primary	16,857	5.19	3,573	4.62	1,410	4.05
Middle	1,564	4.81	434	3.62	332	3.60
High	911	4.17	157	3.47	154	3.21
Unknown	316	4.29	37	3.49	9	5.06
All	19,648	5.10	4,201	4.47	1,905	3.91

Educational Level of Husband	1940 Survey		1952 Survey		1962 Survey	
	No. of Couples	No. of Children per Couple	No. of Couples	No. of Children per Couple	No. of Couples	No. of Children per Couple
Primary	17,487	5.19	3,774	4.57	1,468	4.04
Middle	1,647	4.39	354	3.58	383	3.47
High	184	4.74	24	3.13	44	3.09
Unknown	330	4.24	49	3.86	10	4.80
All	19,648	5.10	4,201	4.47	1,905	3.91

(Source) Aoki, Hisao and Eiko Nakano. 1967. "Dai-ichiji kara dai 4ji Shussanryoku Chosa Kekka no Yoyaku" ("Summary results of the first to fourth National Fertility Surveys") Institute of Population Problems Research Study Series, No.177. July.

Table 7 Number of Ever Born Children per Couple with Completed Reproduction by Husband's Occupational Group and Level of Living

Class of Level of Living	1940 Survey :							
	Agriculture		Unskilled Work		Non-agricultural Proprietors		White Collar Workers	
	No. of Couples	Children per Couple	No. of Couples	Children per Couple	No. of Couples	Children per Couple	No. of Couples	Children per Couple
Lower	6,614	4.71	1,371	4.08	967	4.00	885	4.01
Middle	3,036	5.47	770	4.37	388	4.14	373	4.15
Upper	491	6.01	77	4.77	387	4.29	222	4.13
All	10,540	4.98	2,413	4.19	2,488	4.08	1,518	4.08

Class of Level of Living	1957 Survey :							
	Agriculture		Unskilled Work		Non-agricultural Proprietors		White Collar Workers	
	No. of Couples	Children per Couple	No. of Couples	Children per Couple	No. of Couples	Children per Couple	No. of Couples	Children per Couple
Lower	929	5.31	417	4.66	383	4.43	467	4.19
Middle	682	5.51	210	4.30	349	4.57	233	4.07
Upper	126	5.65	83	4.53	69	3.97	183	3.73
All	1,737	5.42	714	4.53	805	4.45	889	4.08

Class of Level of Living	1962 Survey :							
	Agriculture		Unskilled Work		Non-agricultural Proprietors		White Collar Workers	
	No. of Couples	Children per Couple	No. of Couples	Children per Couple	No. of Couples	Children per Couple	No. of Couples	Children per Couple
Lower	391	4.08	363	3.70	182	3.94	203	3.35
Middle	157	4.47	153	4.04	35	4.31	127	3.46
Upper	46	4.39	67	3.98	25	4.12	62	3.32
All	594	4.21	583	3.82	244	4.02	397	3.38

(Source) See table 6 (Aoki and Nakano).

Table 8 Quintum Values of Marriage Cohorts by Education and Economic Activities of Husbands: Parities 1-3

Parity / Category		1905-14	1915-24	1925-34	1935-44	1945-49	1950-54	1955-59	1960-67
Parity 1		0.853	0.864	0.867	0.883	0.839	0.852	0.878	0.896
Educational	Primary	0.855	0.868	0.869	0.885	0.839	0.841	0.878	0.885
Level of Husband	Middle	0.863	0.851	0.848	0.875	0.837	0.852	0.889	0.902
	Higher	0.830	0.849	0.888	0.899	0.863	0.891	0.867	0.900
Agriculture	Agriculture	0.880	0.892	0.902	0.882	0.904	0.822	0.879	0.856
Non-agriculture	Non-agriculture	0.804	0.836	0.845	0.884	-	-	-	-
Work Status	Self-employer	0.845	0.848	0.834	0.872	0.820	0.911	0.882	0.900
	Employed	0.745	0.822	0.853	0.889	-	-	-	-
	White Collar	-	-	-	-	0.844	0.850	0.878	0.901
	Blue Collar	-	-	-	-	0.799	0.815	0.891	0.896
Parity 2		0.829	0.851	0.816	0.862	0.856	0.817	0.802	1.000
Educational	Primary	0.834	0.864	0.824	0.859	0.885	0.843	0.819	0.956
Level of Husband	Middle	0.766	0.777	0.801	0.878	0.831	0.791	0.805	-
	Higher	0.857	0.787	0.767	0.847	0.759	0.763	0.753	1.000
Agriculture	Agriculture	0.850	0.893	0.872	0.903	0.897	0.876	0.857	-
Non-agriculture	Non-agriculture	0.790	0.808	0.781	0.846	-	-	-	-
Work Status	Self-employer	0.831	0.833	0.798	0.837	0.869	0.819	0.821	-
	Employed	0.705	0.781	0.771	0.849	-	-	-	-
	White Collar	-	-	-	-	0.796	0.776	0.780	0.928
	Blue Collar	-	-	-	-	0.902	0.807	0.792	0.990
Parity 3		0.812	0.807	0.820	-	0.592	0.429	0.301	0.361
Educational	Primary	0.819	0.819	0.831	-	0.646	0.496	0.301	0.376
Level of Husband	Middle	0.762	0.714	0.799	1.000	0.530	0.387	0.336	0.324
	Higher	0.786	0.827	0.738	0.744	0.400	0.248	0.274	0.398
Agriculture	Agriculture	0.838	0.849	0.840	-	0.749	0.546	0.418	0.608
Non-agriculture	Non-agriculture	0.763	0.763	0.807	1.000	-	-	-	-
Work Status	Self-employer	0.810	0.804	0.800	1.000	0.602	0.459	0.317	0.436
	Employed	0.663	0.722	0.811	1.000	-	-	-	-
	White Collar	-	-	-	-	0.490	0.318	0.265	0.303
	Blue Collar	-	-	-	-	0.512	0.422	0.250	0.302

(Note) Quintum denotes parity progression ratio from the previous parity to the one as indicated. Quintum for parity 1 indicates a progression from marriage to parity.

Table 9 Quintum Values of Marriage Cohorts by Education and Economic Activities of Husbands: Parities 4-8

Parity / Category		4th to 8th Parity (Months)			
		1905-14	1915-24	1925-34	1935-44
Parity 4		0.773	0.771	0.770	-
Educational	Primary	0.769	0.782	0.784	-
Level of Husband	Middle	0.816	0.727	0.723	0.769
	Higher	0.833	0.638	0.711	0.623
Agriculture	Agriculture	0.781	0.822	0.798	-
Non-agriculture	Non-agriculture	0.755	0.712	0.750	-
Work Status	Self-employer	0.775	0.747	0.771	-
	Employed	0.739	0.681	0.737	-
Parity 5		0.752	0.752	0.733	-
Educational	Primary	0.749	0.768	0.763	-
Level of Husband	Middle	0.765	0.638	0.627	-
	Higher	0.900	0.606	0.650	0.474
Agriculture	Agriculture	0.765	0.785	0.781	-
Non-agriculture	Non-agriculture	0.725	0.711	0.697	-
Work Status	Self-employer	-	-	-	-
	Employed	0.722	0.715	0.697	-
Parity 6		0.719	0.716	0.701	-
Educational	Primary	0.726	0.731	0.739	-
Level of Husband	Middle	0.581	0.513	0.580	-
	Higher	0.888	0.769	0.509	0.391
Agriculture	Agriculture	0.749	0.758	0.746	-
Non-agriculture	Non-agriculture	0.651	0.654	0.664	-
Work Status	Self-employer	-	-	-	-
	Employed	0.644	0.653	0.662	-
Parity 7		0.727	0.682	0.629	-
Educational	Primary	0.726	0.695	0.669	-
Level of Husband	Middle	0.740	0.521	0.435	-
	Higher	0.500	0.667	0.409	-
Agriculture	Agriculture	0.736	0.730	0.687	-
Non-agriculture	Non-agriculture	0.702	0.614	0.575	-
Work Status	Self-employer	-	-	-	-
	Employed	0.700	0.614	0.576	-
Parity 8		0.654	0.615	0.621	-
Educational	Primary	0.673	0.613	0.645	-
Level of Husband	Middle	0.357	0.633	0.456	-
	Higher	0.429	0.643	0.695	-
Agriculture	Agriculture	0.662	0.616	0.665	-
Non-agriculture	Non-agriculture	0.630	0.613	0.562	-
Work Status	Self-employer	-	-	-	-
	Employed	0.628	0.616	0.567	-

(Source) Yoshikazu Watanabe. 1992. "A cohort analysis of fertility decline in Japan at the time of demographic transition" in Sigemi Kono. (ed). *Fertility Decline in Developing Countries*. Tokyo: Institute of Developing Economies.

Table 10 T Values (tri-mean) of Birth Intervals for Marriage Cohorts by Parity and Education and Economic Activities of Husbands: 1st to 3rd Parity (Months)

Parity / Category		1905-14	1915-24	1925-34	1935-44	1945-49	1950-54	1955-59	1960-67
Parity 1		17.731	16.349	15.443	15.482	22.116	20.077	21.890	22.003
Educational	Primary	17.221	16.318	15.470	15.484	22.019	19.366	20.240	20.763
Level of Husband	Middle	18.526	16.097	15.525	15.465	22.242	20.701	22.133	22.111
	Higher	15.323	16.289	13.487	15.494	22.076	22.313	21.905	22.283
Agriculture	Agriculture	17.894	16.148	14.973	15.491	21.987	20.007	20.051	21.900
Non-agriculture	Non-agriculture	16.394	17.024	15.436	15.479	-	-	-	-
Work Status	Self-employer	16.321	16.949	15.387	16.233	21.452	19.303	22.443	21.391
	Employed	17.648	17.115	15.481	15.399	-	-	-	-
	White Collar	-	-	-	-	22.135	20.184	20.296	22.301
	Blue Collar	-	-	-	-	22.293	20.098	20.155	20.206
Parity 2		29.579	27.827	27.313	28.505	27.433	28.443	29.020	34.135
Educational	Primary	29.587	27.938	27.400	28.606	27.256	28.467	29.000	31.976
Level of Husband	Middle	27.486	26.100	26.175	28.262	30.126	28.206	28.409	-
	Higher	38.707	22.930	25.270	28.321	28.107	30.800	30.466	32.347
Agriculture	Agriculture	29.592	27.330	28.099	28.444	25.701	28.366	28.523	-
Non-agriculture	Non-agriculture	28.581	26.800	25.626	28.544	-	-	-	-
Work Status	Self-employer	29.191	26.853	26.239	28.494	27.419	29.119	29.184	-
	Employed	27.607	27.315	25.580	28.563	-	-	-	-
	White Collar	-	-	-	-	27.792	29.843	28.521	33.999
	Blue Collar	-	-	-	-	27.217	27.420	28.940	34.271
Parity 3		30.539	28.547	29.786	-	30.281	30.524	30.354	33.434
Educational	Primary	30.488	29.045	29.756	-	30.305	30.270	30.354	32.230
Level of Husband	Middle	32.866	29.166	29.684	35.106	29.031	30.622	29.160	33.534
	Higher	28.457	29.321	31.440	31.289	33.552	32.704	31.206	34.276
Agriculture	Agriculture	30.585	28.995	29.647	-	30.280	30.502	28.600	31.410
Non-agriculture	Non-agriculture	29.889	28.616	30.414	35.024	-	-	-	-
Work Status	Self-employer	29.719	28.363	28.567	34.227	31.906	30.960	30.385	32.095
	Employed	30.583	30.911	31.143	35.103	-	-	-	-
	White Collar	-	-	-	-	28.366	31.290	31.117	33.510
	Blue Collar	-	-	-	-	30.287	32.069	29.685	33.532

(Source) Yoshikazu Watanabe, 1992. "A cohort analysis of fertility decline in Japan at the time of demographic transition" in Shigemi Kono, (ed). *Fertility Decline in Developing Countries*. Tokyo: Institute of Developing Economies. (in Japanese)

Table 11 T Values (tri-mean) of Birth Intervals for Marriage Cohorts by Education and Economic Activities of Husbands: 4th to 8th Parity (Months)

Parity / Category		1905-14	1915-24	1925-34	1935-44
Parity 4		31.130	28.526	31.341	-
Educational	Primary	31.155	28.543	31.288	-
Level of Husband	Middle	30.425	28.220	32.082	33.968
	Higher	32.691	32.190	33.121	30.937
Agriculture	Agriculture	31.093	28.579	30.702	-
Non-agriculture	Non-agriculture	31.242	28.451	31.457	-
Work Status	Self-employer	31.263	28.865	32.126	-
	Employed	30.611	29.568	31.382	-
Parity 5		30.248	30.209	31.197	-
Educational	Primary	29.187	30.250	31.233	-
Level of Husband	Middle	32.713	28.421	29.722	-
	Higher	30.255	27.892	33.597	27.640
Agriculture	Agriculture	30.418	30.161	31.124	-
Non-agriculture	Non-agriculture	28.405	29.744	31.274	-
Work Status	Self-employer	-	-	-	-
	Employed	28.526	29.753	31.284	-
Parity 6		30.354	30.522	32.645	-
Educational	Primary	30.383	30.613	32.684	-
Level of Husband	Middle	29.588	28.405	32.475	-
	Higher	27.725	24.714	34.084	37.938
Agriculture	Agriculture	30.399	30.494	31.415	-
Non-agriculture	Non-agriculture	30.290	30.606	33.418	-
Work Status	Self-employer	-	-	-	-
	Employed	30.251	30.609	33.385	-
Parity 7		29.727	31.072	31.504	-
Educational	Primary	30.311	31.118	31.503	-
Level of Husband	Middle	25.711	28.395	33.284	-
	Higher	33.200	29.705	30.588	-
Agriculture	Agriculture	30.271	31.036	32.592	-
Non-agriculture	Non-agriculture	29.636	30.568	31.467	-
Work Status	Self-employer	-	-	-	-
	Employed	29.713	30.029	31.455	-
Parity 8		30.406	30.566	31.372	-
Educational	Primary	30.326	30.449	31.471	-
Level of Husband	Middle	34.117	30.591	32.003	-
	Higher	40.150	42.367	26.797	-
Agriculture	Agriculture	29.815	30.378	30.383	-
Non-agriculture	Non-agriculture	30.530	31.306	34.090	-
Work Status	Self-employer	-	-	-	-
	Employed	30.397	31.306	34.083	-

(Source) Yoshikazu Watanabe, 1992. "A cohort analysis of fertility decline in Japan at the time of demographic transition" in Shigemi Kono, (ed). *Fertility Decline in Developing Countries*. Tokyo: Institute of Developing Economies.

Table 12 Changes in Tri-means of Birth Intervals for Marriage Cohorts by Parity and Economic Activities Status: 1st to 3rd Parity (Months)

Parity / Category	1915-24	1925-34	1935-44	1945-49	1950-54	1955-59	1960-67
Parity 1							
Educational Level of Husband							
Primary	-1.382	-0.906	0.039	6.634	-2.039	1.813	0.113
Middle	-0.903	-0.848	0.013	6.536	-2.654	0.874	0.523
Higher	-1.429	-1.572	-0.060	6.777	-1.542	1.432	-0.023
Agriculture	0.965	-2.801	2.006	6.582	0.237	-0.408	0.379
Non-agriculture	-1.746	-1.175	0.518	6.497	-1.980	0.044	1.849
Work Status							
Non-agriculture	0.630	-1.588	0.043	-	-	-	-
Self-employed	0.628	-1.562	0.846	5.219	-2.419	3.140	-1.053
Employed	-0.533	-1.634	-0.082	-	-	-	-
White Collar	-	-	-	-	-1.951	0.111	2.005
Blue Collar	-	-	-	-	-2.195	0.057	0.051
Parity 2							
Educational Level of Husband							
Primary	-1.752	-0.514	1.192	-1.072	1.010	0.577	5.115
Middle	-1.648	-0.538	1.206	-1.350	1.211	0.533	2.976
Higher	-1.387	0.075	2.088	1.863	-1.920	0.203	-
Agriculture	-15.777	2.340	3.051	-0.215	2.694	-0.334	1.881
Non-agriculture	-2.262	0.769	0.345	-2.743	2.665	0.157	-
Work Status							
Non-agriculture	-1.780	-1.175	2.919	-	-	-	-
Self-employed	-2.338	-0.614	2.255	-1.075	1.700	0.065	-
Employed	-0.292	-1.735	2.983	-	-	-	-
White Collar	-	-	-	-	2.051	-1.322	-
Blue Collar	-	-	-	-	0.203	1.520	-
Parity 3							
Educational Level of Husband							
Primary	-1.992	1.239	-	-	0.243	-0.170	3.080
Middle	-1.443	0.711	-	-	-0.035	0.084	1.877
Higher	-3.700	0.518	5.421	-6.075	1.591	-1.462	4.374
Agriculture	0.863	2.120	-0.151	2.263	-0.848	-1.498	3.070
Non-agriculture	-1.590	0.652	-	-	0.222	-1.902	2.810
Work Status							
Non-agriculture	-1.273	1.798	4.610	-	-	-	-
Self-employed	-1.357	0.204	5.660	-2.322	-0.946	-0.575	1.710
Employed	0.328	0.232	3.960	-	-	-	-
White Collar	-	-	-	-	2.924	-0.173	2.393
Blue Collar	-	-	-	-	1.782	-2.384	3.847

Table 13 Changes in Tri-means of Birth Intervals for Marriage Cohorts by Education and Economic Activities of Husbands Socio-Economic Status: 4th to 8th Parity (Month)

Parity / Category		1905-14 to 1915-24	1915-24 to 1925-34	1925-34 to 1935-44
Parity 4		-2.604	2.815	-
Educational Level of Husband	Primary	-2.612	2.745	-
	Middle	-2.205	3.862	1.886
	Higher	-0.501	0.931	-2.184
Agriculture Non-agriculture	Agriculture	-2.514	2.122	-
	Non-agriculture	-2.791	3.006	-
Work Status	Self-employer	-2.398	3.261	-
	Employed	-1.044	1.815	-
Parity 5		-0.039	0.988	-
Educational Level of Husband	Primary	1.063	0.982	-
	Middle	-4.292	1.351	-
	Higher	-2.363	5.706	-5.958
Agriculture Non-agriculture	Agriculture	-0.258	0.964	-
	Non-agriculture	1.340	1.530	-
Work Status	Self-employer	-	-	-
	Employed	1.226	1.513	-
Parity 6		0.168	2.123	-
Educational Level of Husband	Primary	0.230	2.071	-
	Middle	-1.183	4.070	-
	Higher	-3.011	9.370	3.854
Agriculture Non-agriculture	Agriculture	0.095	0.921	-
	Non-agriculture	0.316	2.812	-
Work Status	Self-employer	-	-	-
	Employed	0.359	2.776	-
Parity 7		1.345	0.432	-
Educational Level of Husband	Primary	0.806	0.386	-
	Middle	2.684	4.870	-
	Higher	-3.496	0.884	-
Agriculture Non-agriculture	Agriculture	0.765	1.557	-
	Non-agriculture	0.932	0.898	-
Work Status	Self-employer	-	-	-
	Employed	0.316	1.426	-
Parity 8		0.160	0.806	-
Educational Level of Husband	Primary	0.122	1.022	-
	Middle	-3.526	1.412	-
	Higher	2.217	-15.569	-
Agriculture Non-agriculture	Agriculture	0.564	0.005	-
	Non-agriculture	0.776	2.784	-
Work Status	Self-employer	-	-	-
	Employed	0.909	2.776	-

(Source) Same as Table 11.

changes between cohorts. From parity 4 to 5, and parity 5 to 6, it is observed that the birth interval has notably lengthened among the highly educated and medium educated groups. Education group shows 5.7 months increase between parity 4 and 5, even larger 9.4 months increase between parity 5 and 6. This means to say that while the family planning was spreading and the fertility was declining, the decline went first through the higher educational groups. These educational groups seem to be the vanguard of family size reduction. Together with the observation made in relation to Q value change, it might be alluded that educational factors were quite important in the dawn of family planning movement in Japan.

Interpretation and implication of the Japanese experience

It was observed from the cohort marital fertility change from the previous national fertility surveys that the fertility transition began even before World War II. Actually, along with the process of demographic transition, considerable economic and social development was on going before the war in terms of health improvement which was attributable to the elevation in nutritional level, enhancement in educational levels, improvement in medical and public health institutions and facilities and specifically prevention from venereal diseases. These factors were put together and as a consequence the nation's general fertility level increased in the 1920s rather than decreased. This was evidenced in Q-values in low parities of first and second in cohort 1915-24. This increase in fertility itself coincides with the trend and pattern experienced in Europe at an early stage of industrial revolution.

But, at the same time, the decade of 1920s witnessed the beginning of fertility decline for the first time caused by the people's efforts responding to the worsening men-land ratio during the pre-war period and inspired by Mrs. Sanger's visit to Tokyo for the first time. Tables 8 and 9 suggest fairly clearly that through the cohort analysis fertility started declining in higher parities such as 4th and 5th among the educated groups of people. In the 1920s the number of highly educated such as graduates from universities and technical colleges was considerably limited, hence they constituted the elite of the people, living in urban areas. An idea of family planning was accepted and legitimated and methods had ever been practiced for the first time by this elite group.

Let me refer to a personal experience of my relatives which may support the above reasoning. I had an aunt and an uncle-in-law who got married in 1931. The uncle-in-law was a graduate from the University of Tokyo majored in physics, but they had only three children, the number being rather small at that time. Much later, my aunt confided me that they had been

intentionally limiting their number of children through family planning. The essential point of departure is that the husband had a higher level of education and they were residing in the Tokyo Metropolitan area. On the other hand, another aunt who had already borne six children before her age of 33 and who was living in a prefecture fairly remote from the metropolis but maintaining rather well-to-do life, has also told me recently that she did not know the idea of family planning at all before World War II.

Coming back to the Aoki-Nakano data, it is very interesting to note that fertility differentials in terms of the number of children ever born to the mothers having completed their reproduction were not so significantly different among socio-economic groups such as general level of living status and occupation, but they were quite significant among different educational levels. Table 5 shows separately fertility of the couples according to education of husband and wife, but it is not very clear whether education of wife was more conducive to fertility differentials than that of husband. The only recent one of 1962 shows a slightly more significance for women's education effect. At any rate, the above-mentioned means to say that educational attainment is important to lead to notable fertility differentials. Why indeed educational difference brought about fertility differentials cannot be explained by the present survey data, but in reference to the previous studies in the United States and to WFS it is likely that the theory of diffusion of "birth control" idea would perhaps be more effective than that economic and social development endogenously triggers the demand for family planning and subsequently the decline in fertility.

10. CONCLUSION

Although it has many minor deviations and irregularities, recent changes in fertility in developing countries seem to follow the general trend of demographic transition, from high birth and high death rates to low birth and low death rates, which originally evolved in Europe, Northern America and other territories where the population of European descendents inhabit.

But, again, the developing world is not a monolith of homogeneity, but is of diversity and heterogeneity. There are, on one hand, Asian NIEs which are characterized by the below-replacement level of fertility, often lower than some of the developed countries and which can be comparable only to the low fertility of Italy, Spain and Germany. In these countries or areas, contraceptive prevalence rate is estimated somewhere at 70-80 percent levels. On the other hand, however, there are vast areas of sub-Saharan Africa, Middle East and

some Moslem countries in South Asia which exhibit very high fertility rates, ranging from 5 to 7.5 in terms of total fertility rate. African fertility would have perhaps even been higher, if traditional postpartum practices, which lead to unusually long intervals between births, were not followed.

In spite of those diversities and heterogeneities of the developing world, a strong statement can be made that fertility has been declining one by one, some being faster and in a wider step and the other slower and to a lesser extent, trailing the paths that European countries experienced in the 19th and sometimes in the early 20th centuries. The countries with substantial economic and social development and strong family planning programmes are faster in the fertility decline and those with poor development and weak or deficient programmes are definitely slower.

For fulfilling the need for accurate and better data for the purpose of ascertaining and assessing the progress of fertility evolution, the DHSs have maintained a good tradition of its predecessor, WFS, and have moreover expanded its territorial coverage. They have proven their usefulness by providing up-to-date fertility data, thus keeping sequel to WFS data and at the same time supplying continuously valuable information for proximate determinants and socio-economic characteristics of fertility, whereby cross-tabulations and multivariate analyses are made possible for fertility determination.

The analyses of WFS data together with other previous surveys have led to a conclusion that policy efforts and ideational factors are more important to determine the extent of fertility reduction in the developing countries. This point seems to concur with the outcomes of DHS, though DHS's main objective is not necessarily to explore economic and social factors affecting fertility.

An interpretation of retabulations of past Japanese National Fertility Surveys has given rise to some significant conclusions. That is to say that educational characteristics were a key to the initiation of fertility control in prewar Japan. The process that the fertility decline started out in the moderately to highly educated groups and was later gradually spreading to low groups was accorded to the course of transition that the idea of family planning was diffusing from the highly educated to the poor and less educated. This implies that even in poor setting, education serves the function of disseminating the idea of family planning which may be accelerated by strong programmes along the conduit of similar culture, religion, language and ethnicity.

Once development was called the best contraceptives. That remains largely true, but not necessarily always very true. The world cannot wait until the

development has been accomplished before the decline of fertility and a slower rate of population growth. The experiences of Bangladesh and Kenya demonstrate that careful and intensive efforts can attain fertility decline even in the poorest conditions beyond the threshold which the conventional wisdom has set. Now it has widely been recognized in the developing countries that policies and programmes can promote low fertility which will, in turn, facilitate development.

NOTE

1. However, this does not mean that economic factors are unimportant. On the contrary, as demonstrated by Gary Becker and disciples of his school, economic factors in terms of increasing women's labour participation income, wage rate, saving rate are important for conditioning fertility as expressed by foregone opportunity cost and cost of time along with the process of modernization and advancement of education.

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