

ASIAN FERTILITY TRANSITION
Is Gender Equity In Formal Occupations
an Explanatory Factor?

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1. Introduction

Early writers on fertility decline (Thompson 1929; Davis 1945 1955 1963; Notestein 1945; Freedman 1961-62) emphasized broad forces of modernization, such as urbanization, industrialization, shifts to non-agricultural labor, and increased literacy, as bringing about changes in traditional structures. The neoclassical theoreticians shifted the focus to the micro-level and translated the changes in macro conditions into individual and household calculations. Both these strands of theoretical work have come under attack in recent years. Among the macrolevel changes, one force of change which has shown robust association with fertility decline is female literacy (Levine et al 1993). However, a question raised in this context is: how is it that "the level attained in a few years of attendance at low-quality schools during her childhood could be retained by the average woman in her childbearing years and have an impact on her child health care and reproduction sufficient to affect birth and death rates?" (Levine et al. 1994: 186). Answering this question would require measuring literacy skills, such as reading and decontextualised language ability, directly, "which has not been done in demographic research to date" (Levine et al. *ibid*).

The Princeton University based European Fertility Project, while instrumental in undermining classic demographic transition theory, suggested that fertility was significantly related to "culture", defined operationally as language, ethnicity, or geographical region. This has been interpreted as diffusion of ideas- thinkability of fertility control- and contraceptive technology. This diffusion is thought to occur through social networks (Watkins 1987). But what are these networks, and how do they facilitate diffusion? Do all social networks facilitate diffusion or do some inhibit diffusion? These are important questions in this context.

The rapidity and pervasiveness of fertility decline in countries that differ in economic conditions, social structures, political regimes, national history, and culture suggests it is an outcome of profound changes in "ideas, aspirations, and attitudes rather than techniques" and that some mechanism of diffusion was involved. What was being diffused, in Coale's terminology, was the thinkability of fertility control (Watkins 1987). Beckman (1983) described friends and neighbors as the most frequent sources of information and influence regarding contraception. Later, referring to Lee's (1979) work on Korea, she says "a woman is more likely to adopt family planning if women in her social network have already done so. Peer contacts provide women not only with information but also with emotional support" (p.429). Who are these friends and neighbors who think of fertility control in the first place? It may be hypothesised that they are the educated women who have entered occupations, such as physicians, teachers, and modern production workers, which have a modernising influence on society. New networks form around them and

they become the peers who are instrumental in providing information and emotional support to the women in their social network. Thus, the emphasis is on opinion leadership, social networks, and social process in shaping ideas, attitudes, and behavior (Retherford and Palmore 1983).

The role of social networks in shaping ideas is not new to the societies undergoing fertility change. Every society has its social networks, but there is something specific to the social networks in societies undergoing fertility change; these networks are receptive to changes in ideas, and attitudes and do not inhibit certain kinds of changes. In this context, the gender equity in employment in the formal occupations becomes relevant. The entry of women into these occupations is itself an innovation. What they do and profess often has great influence on others as they are often looked upon as role models by the other young women and girls in the community. Shamiran's story from Bangladesh quoted in Pollak and Watkins (1993) illustrates this idea. Two key social changes underlying the story are girls going to school in large numbers, and a woman appointed as a community-based family planning worker. Although, initially there was strong disapproval to the presence of women family planning workers- a result of existing social networks diffusing ideas opposed to the entry of women into new occupations- their trustworthiness and credibility was soon established. With it, a new network of information and exchange of ideas was established with the family planning worker at one end, receiving new knowledge from outside, and the young women and girls at the other end. Similar networks also form around women physicians and teachers who command even more respect and influence in this regard.

Note some of the reactions of the young girls in Shamiran's story to the presence of Mukti Ma, the family planning worker: "this lady is wearing her sari the way I have seen my relatives, who live in the city, wear their saris"; "she earns good amount of money"; and "I would like to work as she does". These reactions would be equally true with regard to the female teachers and physicians working in the village, who supplant the traditional influence of elders. The younger women who become teachers, physicians, and family planning workers form the peer group for the younger women and the school girls. Quite often, discussions take place in the school, as in the case of Shamiran's story and the school becomes an effective base for forming further networks. The social process by which women enter the formal occupations, as teachers, physicians, and production workers, not only empowers women and brings about gender equity but may also build lasting social networks.

In general, female employment as school teachers and as physicians and health workers is distinctly superior to female employment in the formal sector for two important reasons. First, female employment in the schools and hospitals involves a wider geographical spread. Second, it inherently involves a greater process of socialization as teachers and physicians must continuously interact with students and patients, which is not true of other formal sector employment.

How is the entry of women into these three occupations to be captured in an empirical analysis? One obvious measure is the proportion of female workers to the total population of workers. However, the proportion of female workers to the total is related to the level of female literacy itself. This relationship may be formalised to arrive at a norm. In cases where female participation conforms to this norm it may

be difficult to distinguish its effect, from that of female literacy, on fertility related variables. If female participation is different from the norm, then a relationship between fertility reduction and female participation stronger than that between fertility reduction and female literacy would go a long way to confirm the hypothesis of diffusion through social networks formed around women employed in formal occupations. This paper addresses the issue of fertility reduction from such a perspective.

The first step in this exercise is to compute the percentage decline in Total Fertility Rate (TFR) between 1970 and 1991 of all the developing countries for which data were presented in the World Development Report 1993. There were 37 countries, out of over 100, showing decline in fertility and they were grouped by their TFR in 1991 and the percentage decline. In successive steps their levels of urbanization, industrialization, female literacy, and secondary school enrollment of girls were compared. Although conventional wisdom about the association of high levels of urbanization and industrialization with low levels of TFR did hold, the Asian countries which had experienced fertility decline were an exception. They had extremely low levels of urbanization and industrialization, and in some cases low levels of female literacy and secondary school enrollment of girls.

The next stage of analysis was confined to the relatively better performers in the group (26 countries out of the 37). Women's labor force participation in three occupations, namely, clerical, administrative, and professional, were compared across the countries¹. The proportion of women in clerical and administrative occupations were distinctly higher for the urbanized and industrialized countries. The same could not be said about the proportion of women in the professional occupations; they were not significantly lower for some of the Asian countries in the group. *Professional occupations is an aggregate of teaching, nursing and other occupations and going by Boserup's² finding that "two-thirds or more of all women in the professions are teachers", it is dominated by teachers. Thus, a very high level of women's participation in teaching seems to be a common thread observable across the countries undergoing fertility transition.*

The discovery of a common thread in women's participation in the teaching profession guided the next stage of analysis. This particular factor was analyzed in greater detail for three countries- Thailand, Bangladesh and India- which had the lowest levels of urbanization, industrialization and secondary school enrollment of girls among the countries showing fertility decline in the last two decades. The reasons for pursuing this thread in greater detail are the following. In largely rural and agricultural societies, the share of clerical and administrative occupations in the three formal occupations is low and is confined to the urban pockets. Hence, teaching becomes the first and most important occupation for educated labor. Women's participation in the teaching profession has four important characteristics: (i) it empowers women by providing them with a regular source of income; (ii) it is a measure of the validation of their education in that a certain level of education is a condition of entry into the profession; (iii) it is a measure of gender equity in that formal sector labor market which is in the forefront of the modernisation process; and (iv) it has the widest geographical spread among the formal sector employment. Hence the emphasis throughout the paper on proportion of female teachers.

2. Fertility Decline: Urbanization, Industrialization and Gender Equity

The countries listed in the World Development Report 1993 were arranged by their TFRs in 1991 and the percentage decline in TFR between 1970 and 1991³. The results are presented in Table 1. There are four countries appearing on the bottom left hand corner of the Table which had their fertility transition well on their way by 1970 as indicated by the TFR in 1970 and, consequently, subsequent, declines in TFR were low. The rest of the countries were arranged in three columns. The last column has 13 countries with various fertility levels in 1970, all showing rapid declines in fertility (over 40 percent) between 1970 and 1991. The first column has 12 countries, all of them reporting fairly high levels of fertility in 1970, and showing very low rates of decline. Four countries at the top, except Pakistan, had not shown any decline till 1980. In the middle column, out of the eight countries four at the top had not shown any decline in fertility till 1980; the rest had shown some drop already by 1970 but the decline since then has been moderate. One of the observations that may be drawn from the Table is that the rate of decline is not related to the stage of decline. In other words, it is not true that those countries which had begun their decline earlier than 1970 had a higher decline than those who had begun later.

Are there any characteristics common to the countries in terms of the often mentioned explanatory factors of fertility decline? As a first step in the search for common characteristics, the countries were arranged by the percentage of urban population in 1970 in an ascending order. The good performers (26 countries with TFR below four in 1991, or fertility decline above 30 percent during 1970-91) were found to fall into two distinct groups: nine of them were at the top end and were highly urbanised by 1970; six of them were at the bottom with extremely low levels of urbanisation; and the rest of the countries were distributed with various levels of urbanisation. The nine countries in the first group were all Latin/Central American ones - Panama, Brazil, Columbia, Mexico, Trinidad and Tobago, Venezuela, Chile, Argentina and Uruguay; and the six in the second group were all Asian countries- Bangladesh, Thailand, Indonesia, India, Sri Lanka, and Malaysia. The growth of urbanisation between 1970 and 1990 has not brought about any significant change in the ranking of these countries; the exceptions were Korea, and Malaysia, with changes in percent urban population of 31 and 16 points respectively. The other Asian countries, which had shown rapid decline in fertility, all had low rates of growth of urban population. Among the poor performers, there were countries which had fairly high proportion of urban population as well as low, bringing out the lack of any clear cut relationship between urbanisation and fertility decline.

As a second step, the 37 countries were arranged by the share of industry in Gross Domestic Product (GDP) in 1970 in an ascending order. Out of the nine highly urbanised good performers, all but Panama were highly industrialised with the share of industry in GDP of over 35 percent; for Panama it was 21 percent. All the six countries of the second group had significantly lower industry share in GDP, varying from nine percent at the lowest for Bangladesh to 25 percent at the highest for Malaysia.

At the third step countries were arranged by their levels of female literacy in 1990 and secondary school enrollment of girls in the late 1980s (year varies). All the good performers (26 countries) had female literacy of over 80 percent; the exceptions were Indonesia (62 percent), Tunisia (56 percent),

Malaysia (70 percent), India (34 percent), El Salvador (79 percent), Algeria (45 percent), Morocco (38 percent), Bangladesh (22 percent) and Honduras (71 percent). Note that India and Bangladesh have the lowest female literacy among the 37 countries listed here, only slightly higher than their neighbours Pakistan and Nepal. Arranging the countries by the rate of secondary school enrollment showed no clear patterns, but Bangladesh, India and Thailand stood among the bottom quarter of the countries with rates of enrollment of secondary school girls below 30 percent. Overall, there is an inverse relationship between female literacy and TFR but at each level of female literacy the range of TFR is very wide. For instance, at 60 percent female literacy the range of TFR across countries is between 3 and 6.5.

By summarising the findings of the fourfold comparison carried out so far a few patterns may be drawn. One group of countries among the good performers are highly urbanised, industrialised, and have comparatively high levels of female literacy and have varying levels of secondary school enrollment of girls. These countries are from the Latin/Central American region. A second group of good performers have low levels of urbanisation, industrialisation and secondary school enrollment of girls. India, Bangladesh and Thailand belong to this group. Gender gap in secondary school enrollment for girls was also high for this group. However, in Thailand female literacy was high. The rest of the countries have reported various combinations of urbanisation, industrialisation, level of female literacy and secondary school enrollment of girls. But the fact that good performers can be seen situated at two extreme ends of the spectrum of urbanisation, industrialisation, female literacy and secondary school enrollment of girls raises serious doubts about the explanatory power of these factors.

One of the factors not brought into the comparison so far is female labor force participation. Female labor force participation in the aggregate is not easy to compute and interpret because of ambiguities in defining participation in agriculture, household industry and services. What has been taken here, instead, is the proportion of women in the labor force in three occupations, namely, clerical, administrative and professional, all of which have education as an entry condition.

The data for the comparison of women's participation in the three occupations is taken from the classic work by Boserup (op. cit., fn5) supplemented by Psacharopoulos and Tzannatos (1992)⁴ and refers to the 1960s⁵. The data are presented in Table2. It may be seen that female participation is generally high in professions, followed by clerical occupations and is very low in administration. This pattern holds across all the good performers. Between groups of countries, it may be seen that female labor force participation in the professions is around or above 50 percent for the countries of the Latin/Central American region as well as Philippines; for clerical occupations it was around 30 percent; and in administration it was between 10 and 20 percent. The female labor force participation was significantly lower in the Asian countries in every occupation. They were relatively higher in the professions: while Malaysia, Thailand, and Sri Lanka had participation rates between 28 percent and 39 percent, they were 16 percent or below in India, Korea, Morocco and Bangladesh.

The comparisons of female participation in the occupations need to take into account the levels of female literacy prevailing in the countries. In Latin America, female literacy was high by 1960 and the

primary school enrollment of girls in that year was 71 percent. The gender gap was also narrow. Secondary and tertiary level enrollment of girls was low but showed a rapid increase since then. In contrast, in India, Bangladesh, Morocco, Algeria, Tunisia and Kenya female literacy levels were low in the 1960s and the gender gap in primary school enrollment was significant⁶. By 1985, with the exception of Morocco, the gender gap had come down considerably. As regards secondary school enrollment, in addition to the above countries Indonesia and Thailand also had gender gaps which were significant. These two countries had brought down the gender gap by 1985.

If one were to compare the female participation in occupations in a situation where female literacy is at various levels, then it is necessary to posit female participation as a function of female literacy and evaluate the deviations from the estimated values. This has been elaborated elsewhere⁷ and here we take the functional form, $Y = A + B^L$ where Y is the proportion of female in the occupation and L is the female literacy, for such estimation. By setting terminal values for Y and L, the values of A and B can be derived as -1 and 1.5 respectively. These values can then be used to estimate the values of Y for given values of L. Using the literacy rates for 1960 (as reported in World Development Report 1983), the female participation rates were estimated for the good performers, it was found that for all the countries, except Korea and Bangladesh, the observed female participation rates in the professions were higher than the estimated values⁸. This may be taken to mean that at the prevailing levels of female literacy these countries were comparable in terms of female participation in the professions. Thus, the countries undergoing fertility transition are at different levels of urbanisation, industrialisation, female literacy and enrollment of girls in the secondary school; but given their levels of development they are comparable in terms of gender equity in participation in professional occupations.

The only common thread that could be picked from this exploration of the good performers is the comparable female participation in professions. For further elaboration of this aspect three countries are selected. From the third column of Table 1, Thailand, which has the lowest levels of urbanisation and secondary school enrollment of girls and comparable levels of female literacy and industry's share in GDP, is chosen. From the second column, one each from the early starters and late starters, which was at the bottom in terms of the four variables, was chosen. These happened to be India and Bangladesh. The next three sections are devoted to the discussion of these countries.

3. Towards Gender Equity in Bangladesh

One of the countries showing rapid decline in fertility in the recent past is Bangladesh. This has been called a revolution apparently because the fertility decline has taken place under conditions of poverty and low levels of social development. The dynamic role of the Family Planning Program is often credited with bringing about this revolution⁹. There has been a quiet development taking place in Bangladesh in the area of female literacy and female employment in the formal sector. Its significance arises from its pervasiveness: it has been taking place not only in the urban areas but also in the rural areas. This section attempts at mapping out the contours of this significant development.

Trends in literacy in Bangladesh are presented in Table 3. In interpreting the data on literacy the definitional changes that have taken place ought to be kept in mind. In 1961, literacy was defined as the ability of a person to read in any language with understanding. In 1974, the definition was changed to ability of a person to read and write in any language with understanding. In 1981 and 1991, literate is one who is able to write a letter. As is evident, the definition has become stricter over the decades and only in 1981 and 1991 are they the same. Despite such stricter definition, while male literacy has hardly shown any increase, female literacy has shown an increase in both the urban and rural areas. Noting that literacy has been computed in 1961 taking the population above five years, the period up to 1981 has not shown any significant increase in literacy; all the observed increase has come about after 1981. With the larger increases in female literacy the gender gap has also come down, from 22 percent in 1961 to 13 percent in 1991 in the urban areas and from 17 percent in 1961 to 10 percent in the rural areas. Instead of taking the 7+ years literacy, if we take the 15+ years literacy or adult literacy, then in the urban areas while male literacy increased by less than five percentage points between 1981 and 1991, female literacy increased by 10 percentage points; in the rural areas, the increases were 3.3 and 6.2 percentage points respectively. It is remarkable that female literacy increased at double the rate than male literacy in both urban and rural areas.

The reduction in the gender gap comes out strikingly when the school attendance rates are analysed (Table 4). For the 5 to 9 years age group, gender gap in the urban areas was already low by 1974 and in the rural areas it has come down sharply over the last 20 years, the sharpest declines having taken place between 1981 and 1991. For the 10 to 14 years age group, both in urban and rural areas the gap which was significant in 1974 has virtually disappeared by 1991. For both these age groups, the school attendance rates have also gone up for both the sexes. For the two older age groups, namely 15 to 19 years and 20 to 24 years, attendance rates of males has not shown any increase over the period, but of females has shown a sharp increase. In all cases, large increases have taken place after 1981. Especially striking have been the gains in the rural areas for the females aged 15 to 19 years. Consequently, the gender gap has been coming down. Overall, one noteworthy trend is the steady increase in female enrollment rate in the rural areas at all levels.

The data on the number of students in the schools and colleges corroborates the above findings based on the Population Censuses. As is evident from Table 5, the number of female students has shown an over five fold increase at all levels in the last two decades. The proportion of female students has shown a steady increase over the period and especially striking has been the large gains at the secondary school and general college levels. As the colleges and the schools are geographically spread out, this would corroborate the earlier finding that larger gains were made in the rural areas in the spread of female school attendance. Again the data suggests that significant strides have been made in the 1980s.

Female enrollment as a proportion of the total shows some interesting trends. At the secondary school level, there has been a steady increase in the proportion of girls enrolled. Whereas the proportion showed an eight percentage point increase between 1970-71 and 1981-82, the increase was over 12 percentage points in the next ten years. At the level of general colleges, the proportion increased by around

11 percentage points in each decade. At the university level, although some gains were made during the 1970s no such gains were made in the 1980s. Overall, the gains were spread out and not confined to a few urban pockets.

The labour force participation of women by occupations shows some interesting trends (Table 6). Between 1961 and 1974, in many occupations neither the total participation nor that of women showed much of an increase; the exceptions were two occupations: professional, technical and related; and production, transport and related. In both these occupations total labor force participation almost doubled but women's participation hardly showed any increase. In the period between 1974 and 1983-84, not only total participation but also participation by women showed significant increases in all the five occupations listed in the Table 6. Especially dramatic have been the increases in the participation of women in the professional, clerical, services, and production related occupations. But the period beyond 1983-84 showed a qualitative change in that total employment was growing only in the three occupations- formal occupations- which had education as an entry condition and in all the three, participation of women showed a steady increase. The decline of the number of women in service occupations and the stagnancy in production related occupations together with the phenomenal increase in the formal occupations may be taken as a clear sign of qualitative change in female participation in the labour force.

The gains by women have been especially striking in professional, technical and related occupations: the proportion of women did not show any change between 1961 and 1974, and which was below six percent in 1974 had increased to 11 percent by 1983-84 and jumped to 23 percent by 1989. The trend was similar for school teachers which was part of this occupational group. In the case of primary school teachers, all the jobs created in the 1980s have gone to women. Going by the relation between female literacy and female participation in the occupations introduced in the previous section, the expected proportion was 7.4 percent by 1981 and 10.9 percent by 1991. The observed proportions had begun moving above the expected by 1981 and were significantly higher by 1991. In 1991, the observed proportion of teachers was 18.9 percent, eight percentage points higher than that expected.

An important finding of the analysis needs to be highlighted at this point. No significant increases in female literacy or school enrollment of girls at any level could be observed till 1981. But, already between 1974 and 1981 female participation in the formal occupations, in which education was an entry condition, was showing a steady increase; the increase was sharp in the case of school teachers. It accelerated during the 1980s. School enrollment of girls began going up in the 1980s. The decline in the Total Fertility Rate is also thought to have begun in the 1980s. Thus, the precedence of female participation in the formal occupations, and especially in the teaching profession, cannot be missed.

4. Gender Equity in Thailand

Thailand enacted universal compulsory education into law in 1921. But implementation has been a gradual process and it was only by 1980 that it could be achieved¹⁰. Until the 1970s, school attendance

was compulsory only through the first four grades; it was extended to six grades in the 1970s. The following passage aptly summarises the progress of education in Thailand:

In 1980, the majority (59 percent) of Thais aged 15 or over had exactly a fourth-grade education and only 21 percent had attended more than fourth grade. According to the 1960 census, only 4 percent of women in the major reproductive ages 20-44 had more than fourth-grade education. This increased to 8 percent by 1970 and to 17 percent by 1980. Moreover, 70 percent of women aged 20-44 in 1980 had exactly a fourth grade education. (Knodel et al, op. cit. p.39)

However, the gender gap in literacy was narrow when compared to some other countries at similar levels of development. But the proportion of women graduating to the lower secondary level in the 1950s was 3 percent, 9.5 percent in the 1960s, and 16.8 percent in the 1970s, which were significantly lower than the proportions of men graduating to that level. A similar differential existed at the upper secondary level as well (Table 7). It is only in the 1980s that this differential disappeared.

Turning to the participation of women in the different occupations, it may be seen that already by 1960 in the professional, technical and related occupations nearly 34 percent were women; participation of women was lower at around 10 and 13 percent in administrative and clerical occupations respectively (Table 8). Participation in clerical occupations showed a sharp increase by 1974 but not in administrative or professional occupations. By 1992, in all the three occupations participation of women had shown quantum jumps. During this entire period, participation of women in production and service occupations just about maintained their level. The pattern has some similarities with that observed for Bangladesh.

Education beyond the primary level for females was slow to progress; but female participation in the school system came very early. Data from the School and Teacher Census, 1966 shows that overall by that time over 40 percent of the school teachers in Thailand were women (Table 9). The proportion was lower in the lower primary (four years) level; the upper primary level onwards it was above 45 percent. The information on the proportion by age groups shows that this trend had originated much earlier: in the 1940s itself it was probably around 25 percent.

Overall, Thailand had universal compulsory education enacted in 1921 but completed only by 1980. Secondary school education was received by less than four percent of the population aged 20-44 in 1960 which reached 17 percent by 1980. Gender gap in secondary school enrollment was low to start with, but progress towards closing the gap was also slow. However, female participation in the professions and especially teaching came early and already by the mid-1960s gender equity had been achieved. Fertility decline and secondary school enrollment of girls progressed together since the late 1960s and female participation in the professions preceded both. The developments that have taken place in Bangladesh in the 1980s have many similarities with those in Thailand at an earlier period.

At this point, a brief discussion of the organised family planning efforts is in order. Thailand began its turn away from a pronatalist stance only in the early 1960s. A pilot project was initiated in 1964 and a formal population policy aimed at slowing population growth was adopted in 1970. Since then the antinatalist stance has remained intact. By the time a national policy was declared in 1970, an operational

program was in place which underwent innovative changes through the 1970s. The program was rated high with respect to the availability of services¹¹. Bangladesh has a longer history of family planning efforts. It began with the establishment of clinics by the Family Planning Association of Pakistan during the 1953-59 period. Nearly 3000 service points were established during this period. The program was modified in 1960 to include government health clinics as primary service providers. A comprehensive family planning service was launched in 1965. After independence, the First Five Year Plan (1973-78) established a clear focus on the population crisis. A system of family planning service delivery was established and in 1975 the beginning of program development and implementation was witnessed¹².

Contrasting the experiences of the two countries, it may be seen that Thailand got an operative FP program only by 1970 and was immediately set on a fertility transition whereas Bangladesh had a program for over three decades before setting off on a fertility reduction in the early 1980s. Thailand by the mid-1960s had low levels of schooling but high levels of female participation not only in the production/service occupations but also in the professional occupations and especially in the school system. Bangladesh had low levels of schooling and female participation till the late 1970s; the 1970s saw a change coming about in female participation in production occupations and professional occupations. The latter accelerated in the 1980s, schooling got a boost and demand for family planning services began rising. Comparing the sequence of events in the two countries, it may be concluded that gender equity in the formal occupations, especially in teaching, emerges as a key factor in this whole scheme of things.

5. The Indian Experience - Differential Gender Equity & Differential Fertility Decline

Given that India is a large country with diverse regions and diverse fertility experiences, it is essential to carry out our analysis at the level of the states. The states differ in terms of urbanization, industrialization, female literacy and female participation in the formal occupations. However, all the states have a common long history of family planning programs, beginning in the 1950s with the adoption of the First Five Year Plan. After some experimentation, an extension approach where health workers visit women in the reproductive ages has been implemented since 1966-67¹³ (Visaria and Visaria 1994). What impact the program has had on fertility can only be assessed by the observed decline in fertility.

An inter-state comparison of fertility in relation to urbanization, female literacy and female participation in formal occupations is attempted at the outset. The data are provided in Table 10. As regards urbanization in relation to fertility decline, as in the case of inter-country comparison, no clear relationship seems to exist. There are three groups of states in terms of the range of Crude Birth Rate 1984-90 (CBR 84-90)¹⁴ and within each group, states show varied levels of urbanization. The states within the group having low CBRs had levels of urbanization ranging from below 20 percent to above 50 percent; in the moderate CBR group, urbanization varied from below 10 percent to above 40 percent; in the high CBR group, urbanization varied from around 10 percent to around 30 percent. In fact, 13 of the 17 states had proportions of urban population within a narrow range between 18 and 36 percent with CBRs ranging from 18.3 to 38.1.

The inverse relationship between female literacy and CBR is better defined. However, closer examination shows patterns inconsistent with the overall relationship. Goa and Pondicherry both have comparable levels of female literacy yet their CBRs differ by five. The case of Andhra Pradesh, Orissa, and Haryana is similar. Much worse was the case of the middle seven states, all of which had comparable levels of female literacy in 1981, but only Tamilnadu had a CBR of below 22 in 1987 (CBR 1984-90), having experienced one of the most rapid declines between 1974-80 and 1984-90. Punjab, Himachal Pradesh and Gujarat had fairly high rates of decline; Maharashtra and West Bengal, despite fairly high levels of urbanization, had the lowest declines in fertility. Further, in each of the six states, female literacy had increased by about 30 percentage points between 1961 and 1991, with the exception of Himachal Pradesh where the increase was a phenomenal 51.5 percentage points. Secondary school enrollment of girls in 1987-88 ranged between 61 and 71 percent in the six states, with the exception of Himachal Pradesh where it was 81 percent next only to the highest percentage of 98 in Kerala. In Karnataka, it was 56 percent. The gender gap in literacy in 1991 in these states varied between 20 to 24 percentage points, except in Punjab where it was only 14 percentage points. Thus, whichever aspect of female literacy is analyzed, there is little difference among these states yet fertility decline has varied very widely.

In 1981, numbers of women teaching in the rural areas among the states showed wide variation. At the top were Goa and Kerala with proportions of female teachers around 48 percent; at the bottom were Uttar Pradesh, Rajasthan, Orissa, and Madhya Pradesh with proportions around eight percent. Among the seven states with comparable levels of female literacy, secondary school enrollment of girls, and gender gaps in literacy, participation of women showed wide variation: it was highest at 29 percent for Tamilnadu and Punjab, and lowest at 9.8 percent for West Bengal, and 15.8 percent for Maharashtra. To assess whether participation is high or low, a norm in relation to female literacy is needed. Using the relation posited in Section 2 above, when the expected proportions were computed for the states, it was seen that the actual proportion was significantly higher than the expected proportion in the case of the three high literacy states Goa, Kerala, and Pondicherry. For the four low literacy states, the actual proportions were approximately the expected levels. Among the seven states with comparable levels of female literacy, in Punjab, Tamilnadu, and Gujarat actual proportions were significantly higher than the expected proportions; Himachal Pradesh had female participation slightly higher than the expected level, even when it had one of the most rapid increases in female literacy; Karnataka had an actual proportion just equal to the expected level; and Maharashtra and West Bengal had actual proportions significantly lower than expected.

With regard to the relationship between female participation in teaching and fertility reduction, the four categories of states in terms of states in terms of female participation in teaching mentioned earlier become ordered in terms of their fertility performance, with Haryana still standing in a different class of its own. In comparison with the relationship between fertility and female literacy, the relationship between fertility and female participation in teaching is clearer. The problem with a cluster of seven states having the same level of female literacy but behaving differently in terms of fertility levels or fertility reduction is obviated. The states with higher female participation have reported larger fertility declines. Some of them have reached fairly low levels of fertility (Tamilnadu), while others are on their way to lower levels (Punjab, Gujarat, and Himachal Pradesh). The states with lower levels of female participation in teaching

have all reported fairly low reductions in fertility (Maharashtra and West Bengal in addition to the large north Indian states). How much of the variation in fertility across the states is explained by the proportion of female teachers? As is evident from the regression results shown in Table 12, the coefficient of the proportion of female teachers (Y) in Model I is significantly different from unity and 83 percent of the variation is explained. The addition of the variable, proportion of villages having an educational institution, improved the R²; but the coefficient itself was not significantly different from unity (Model II). Thus, it may be concluded that the proportion of female teachers is a leading factor in explaining the decline in fertility.

However, a closer look at the data raises a few questions. Punjab and Gujarat report proportions of female teachers comparable to that of Tamilnadu, and yet Tamilnadu alone reported a rapid decline. The answer may lie in the process by which the proportion of female teachers in 1981 was achieved. It is possible that the proportion was low at an earlier date, say in 1961, but rapidly increased between 1961 and 1981. Or, it could be that the proportion was high in 1961 and has remained high since then. These two different situations will not produce similar fertility reductions. It may be expected that a state which had a higher proportion at an earlier date will have a lower fertility rate compared to a state which had a lower proportion earlier and a rapid increase more recently. In other words, those states which had a longer history of higher female participation will show a higher fertility decline as compared to those with a shorter history.

From the data on age distribution of teachers in 1981, the proportion of female teachers in 1961 and the change in the percentage over 1961-81 were computed (Table 11). It may be seen that the change in the percentage was fairly high for Gujarat, Himachal Pradesh, Punjab, Tamilnadu, Pondicherry, and Goa; it was low for Uttar Pradesh, Rajasthan, Madhya Pradesh, and Haryana; and was of a moderate magnitude for the remaining states. Thus, there are basically four categories of states: those where female participation in teaching has been high (over 20 percent) for a long time (Kerala, Goa, Tamilnadu); those which have shown significant improvement over 1961-81 (Gujarat, Himachal Pradesh, Punjab, and Pondicherry); those which have shown moderate improvement (Andhra Pradesh, Bihar, Karnataka, Maharashtra, Orissa, and West Bengal); and those which have shown low levels of change (Madhya Pradesh, Rajasthan, and Uttar Pradesh). Haryana does not fall into any of these categories which would probably explain the rapid decline in fertility in Tamilnadu, and absence of it in Punjab, Gujarat, or Himachal Pradesh.

It may be concluded that gender equity in the formal sector employment, especially in the school system, plays an important role in fertility transition. In a country committed to an antinatalist policy for over three decades, where states with comparable levels of female literacy and urbanisation show significant reduction in fertility only in the presence of relatively high female participation in teaching, it may be concluded that gender equity is the most potent factor.

6. Conclusion

In Section 2, in successive steps it was shown that countries which have had fertility reduction in the last two decades had very different levels of urbanization and industrialization. Although the levels of female literacy did not vary as much across countries showing rapid decline in fertility, countries with fairly low levels of female literacy have shown fertility reductions comparable to those with higher levels of female literacy. This was also the case with secondary school enrollment of girls. But female participation in the formal occupations in general and professions in particular was of a high order in every country.

The countries which had very low levels of female literacy and/ or secondary school enrollment of girls but comparable levels of fertility reduction were taken up for detailed analysis. Bangladesh, which had extremely low levels of female literacy and secondary school enrollment of girls- in addition to low levels of urbanization and industrialization- began moving in the direction of gender equity in employment in the formal occupations, and teaching in particular, in the late 1970s. This process was furthered in the 1980s and not only female literacy and secondary school enrollment of girls began rising but also fertility began its downward movement. Although Thailand had enacted compulsory education for a long time, in the 1960s female literacy was low and secondary school enrollment was in single digits, but female participation in the professions was high. much higher was the participation of women in teaching. On this fertile ground was the seed of family planning was sown in the late 1960s and Thailand had a revolutionary reduction in fertility.

Among the Indian states, Kerala would probably approximate the Thailand situation in that it had over 40 percent female participation in teaching by 1960. Kerala had a rapid decline in fertility. Goa and Tamilnadu also had fairly high levels of female participation in teaching for a long time and they quickly followed Kerala in fertility reduction. Punjab, Himachal Pradesh, Gujarat, and Pondicherry had low female participation till 1961, but the increase since then has been high and the reduction in fertility in the last decade has also been high. Some of the large north Indian states have had low levels of female participation for a long time and the fertility reduction has been very low. Thus, what has been observed across the countries and also across the states of India is that gender equity in the formal occupations is a leading factor in fertility reduction.

Overall, the two theories of fertility decline, the female literacy strand and the diffusion strand, cannot be viewed as contending positions, as there is a very close and intricate relation between the two through female participation in the formal occupations. Female participation is an important social force of gender equity, empowerment of women, and modernisation in largely agricultural and rural societies. Women in these occupations become peers and opinion leaders to other women in their community. The process of modernisation occurs through the networks formed around these women. The thinkability of fertility control, like many other ideas, diffuse through these networks.

Notes

1. Occupational groups 0/1, 2, and 3 based on the International Standard Classification of Occupations- 1968. Later on these are called formal occupations.
2. Boscrup,E. 1970. p. 125.
3. Three countries- Mauritius, Papua New Guinea and Peru-which had reported declines in TFR are not shown in Table1 owing to the lack of data on some of the variables used in the analysis.
4. Psacharopoulos,George., and Zafiris Tzannatos. 1992.
5. As the analysis of fertility decline refers to the period 1970 to 1991, the labor force participation needs to be for a time point preceding it. Hence, 1960 was taken. This point gets elaborated in the later sections.
6. King, Elizabeth M., and M.Anne Hill. 1993. pp. 15-6.
7. Narayana,D. 1995.
8. These are overestimates because we have used the overall literacy rates owing to the difficulty in obtaining comparable data on female literacy. As elaborated earlier, gender gap in literacy was significant in many countries.
9. Cleland et al. 1994. fn2. Also, Freedman, Ronald. 1995.
10. Knodel, J et al. 1987. p. 38.
11. Knodel et al. op. cit. pp. 174-6.
12. Cleland et al. op. cit. pp.104-9.
13. Visaria and Visaria. 1994. p.3290.
14. The reason for using CBRs is the availability of comparable figures computed by Mari Bhat. 1994. He has used the reverse survival technique taking the Population Census data.

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Table 1. Fertility, Urbanization, Industrialization, and Female Literacy

TFR in 1991	Percentage Decline in TFR 1970 to 91		
	Below 30	31 to 40	Above 40
Above 5	Pak(25,22,21) Nep(4,12,13) Nic(47,26,...) Ken(10,20,58) Nig(20,14,39)	Hon(29,22,71)	
4 to 5	Par(37,21,88) Bot(8,28,65) Bol(41,32,71) Egy(42,28,34) SAI(42,40,...) Hai(20,...,47)	Ban(8, 9,22) Mor(35,27,38) Alg(40,41,45) Els(40,23,79)	
3 to 4	Ven(78,38,95)	Ind(20,22,34) Mal(27,25,70) CoR(40,24,93)	DoR(40,26,82) Mex(59,29,85) Ecu(40,25,84) Phi(33,32,89) Tun(44,24,56)
2.5 to 3	Arg(78,38,95) TrT(63,44,...)	Chi(75,41,93)	Pan(48,21,88) Jam(42,43,99) Col(57,28,86) Bra(56,38,80) Ido(17,19,62)
2.5 or Below	Uru(82,37,96)		SrL(22,24,83) Kor(41,29,93) Tha(13,25,90)

Glossary of Countries

Pak- Pakistan, Nep- Nepal,
 Nic- Nicaragua, Ken- Kenya,
 Nig- Nigeria, Hon- Honduras,
 Par- Paraguay, Bot- Botswana,
 Bol- Bolivia, Egy- Egypt, SAI- South
 Africa, Hai- Haiti, Ban- Bangladesh,
 Mor- Morocco, Alg- Algeria,
 Els- El Salvador, Ven- Venezuela,
 Ind- India, Mal- Malaysia,
 CoR- Costa Rica, DoR- Dominican
 Republic, Mex- Mexico, Ecu- Ecuador,
 Phi- Philippines, Tun- Tunisia,
 Arg- Argentina, TrT- Trinidad and
 Tobago, Chi- Chile, Pan- Panama,
 Jam- Jamaica, Col- Colombia,
 Bra- Brazil, Ido- Indonesia,
 Uru- Uruguay, SrL- Sri Lanka,
 Kor- Korea, Tha- Thailand.

Sources: World Bank, World Development Report 1993 United Nations, World Urbanisation Prospects: The 1992 Revision

Note: The three numbers within the parantheses are, % urban population in 1970, industry's share in GDP in 1970, and female literacy in 1990.

.. indicates data not available.

Table 2. Female Participation in the Formal Occupations, 1960s
Percentage of Women in the Occupations

Country	Clerical	Administrative	Professional	Expected
Bangladesh	1	0	4	9
Morocco	27	1	13	6
Korea	5	3	14	33
India	3	3	16	12
Malaysia	7	2	28	24
Mexico	41	16	34	30
Thailand	14	9	34	32
Sri Lanka	6	3	39	36
Ecuador	28	7	47	32
Columbia	36	15	47	29
Venezuela	34	11	50	29
Chile	30	17	50	41
Philippines	23	14	51	34
El Salvador	33	17	52	22
Dominican Republic	27	12	53	30
Costa Rica	27	11	56	..
Panama	41*	-	56	34
Uruguay	28	5	57	..
Argentina	29	7	59	45
Brazil	34	11	59	28
Jamaica	50	18	64	39

Sources: Boserup, op.cit., Psacharopoulos and Tzannatos, op.cit., World Development Report 1983

Note: For Panama, 41 percent is a combined figure for the two occupations. Expected Proportions are computed taking the overall literacy for 1960.

Table 3. Literacy by Residence in Bangladesh

Year	Urban- Male	Urban- Female	Rural- Male	Rural- Female
	Percentage Literate (7+ Years)			
1961	47.7	26.1	24.5	7.8
1974	45.3	27.9	25.7	10.8
1981	42.3	25.5	22.6	11.2
1991	46.2	33.3	25.8	16.3
Percentage Literate (15+ Years)				
1974	62.5	33.1	34.6	12.1
1981	58.0	34.1	35.4	15.3
1991	62.6	44.0	38.7	21.5

Source: Bangladesh Bureau of Statistics. Population Census 1991 Volume 1 Analytical Report.1994.

Table 5. Growth of Female Enrollment and Female Participation in Bangladesh

Year	University	General College	Secondary School
Number(000) in 1970-71	2.11	28.92	255
Index of Enrollment and (Percentage Female)			
1970-71	100 (9.99)	100 (7.40)	100 (17.47)
1974-75	305 (19.30)	173 (13.13)	153 (21.39)
1981-82	349 (18.51)	239 (18.22)	243 (25.09)
1985-86	346 (20.51)	398 (19.04)	303 (29.26)
1991-92	572 (22.83)	861 (29.16)	535 (37.27)

Source: Statistical Year Book of Bangladesh, 1980,1986,1993

Table 4. School Attendance Rates by Age, Sex, and Residence in Bangladesh

Year	Urban- Male	Urban- Female	Rural- Male	Rural- Female
Age 5 to 9 Years				
1974	33.7	29.2	21.0	14.4
1981	33.4	29.7	23.4	18.8
1991	50.8	48.9	40.6	37.7
Age 10 to 14 Years				
1974	54.4	46.5	39.1	23.6
1981	47.7	41.5	36.1	25.6
1991	64.0	61.4	54.0	49.8
Age 15 to 19 Years				
1974	40.6	27.2	27.6	4.8
1981	32.4	20.8	23.9	6.0
1991	42.5	33.6	33.8	17.0
Age 20 to 24 Years				
1974	21.9	7.0	12.9	0.5
1981	18.3	6.5	10.4	1.5
1991	22.5	9.7	14.4	2.5

Source: Same as Table 3.

Table 6. Female Labor Force Participation by Occupation in Bangladesh

Year	Female Labor Force Participation by Occupation (No. in ,000) (Percentage Female)						
	Professional	Administrative	Clerical	Service	Production	Teachers (Sec.)	Teachers (Pri)
1961	189	33	169	300	1100	25.318	82.477
1961	100 (4.23)	100 (neg)	100 (neg)	100 (20.67)	100 (11.36)	100 (5.96)	100 (1.95)
1974	198 (5.87)	94 (neg)	123 (neg)	129 (23.06)	204 (4.72)	296 (7.18)	..
1983-84	370 (11.14)	561 (1.62)	402 (5.89)	678 (54.92)	415 (16.88)	366 (10.93)	217 (11.51)
1989	777 (23.14)	476 (5.10)	575 (7.62)	487 (46.44)	488 (14.54)	414 (11.06)	234 (18.31)

Source: Same as Table 5.

Note: Row4 onwards are presented the index numbers with 1961 as the base; figures within brackets are percentage of women.

Table 7. Percentage of Age Cohorts Reaching Levels of Education, 1990

Levels	Age in 1990				
	20-24	25-29	30-39	40-49	50+
Lower Secondary Male	33.5	33.1	25.0	16.9	9.0
Lower Secondary Female	31.4	26.6	16.8	9.5	3.1
Upper Secondary Male	24.0	23.3	16.8	10.0	4.9
Upper Secondary Female	23.6	21.0	13.0	6.1	1.7
Tertiary Male	9.3	11.6	10.4	5.7	2.8
Tertiary Female	12.8	12.5	8.9	4.0	1.2

Source: Knodel, John. 1994. *Gender and Schooling in Thailand*. Working Paper 60, The Population Council.

Table 8. Female Participation in Labor Force by Occupations

Occupations	Percentage of Women in Occupations		
	1960	1974	1992
Professional, Technical, and Related	33.92	30.56	51.91
Administrative, Managerial etc.	9.69	10.88	22.05
Clerical	13.26	25.82	50.92
Production & Service	35.99	27.78	40.69

Sources: *Year Book of Labor Statistics, 1965, 1975*.
Report of the Labor Force Survey, 1992

Table 9. Percentage of Female Teachers by type of Institutions, 1966

Institution	<=20 Yrs.	21-25 Yrs.	26-30 Yrs.	31-40 Yrs.	41-50 Yrs.	50+ Yrs.	All Ages
Lower Primary	41.81	39.23	30.94	24.61	13.82	3.66	25.00
Upper Primary	58.28	56.63	49.03	41.69	29.76	11.58	46.27
Municipal	74.39	74.71	67.54	66.24	58.48	31.32	65.00
Govt. Secondary	61.54	57.19	52.56	56.51	60.05	40.65	54.63
Total	58.43	53.77	45.34	37.29	23.04	14.03	40.37

Source: Final Report: School and Teacher Census, 1966

Table 10. Fertility, Urbanisation, and Female Literacy in the Indian States

States	CBR 74-80	CBR 84-90	%Change	%Urban	Female Literacy (%)			
					1961	1981	1991	Gender Gap 1991
AP	33.5	28.2	15.9	23.3	12.0	24.2	32.7	22.5
Bi	38.2	37.0	3.1	12.5	0.7	16.5	22.9	29.5
Gu	34.2	28.8	15.8	31.1	19.1	38.5	48.6	24.0
Ha	35.9	33.0	7.9	21.9	..	26.9	40.5	27.0
HP	32.7	27.8	15.2	7.6	0.6	37.7	52.1	22.1
Kar	32.2	28.0	13.1	28.9	14.2	33.2	44.3	23.0
Ker	25.0	20.3	18.7	18.7	38.9	75.7	86.9	7.6
MP	39.2	37.2	5.1	19.9	0.7	19.0	28.9	29.0
Ma	30.5	28.8	5.5	35.0	16.8	41.0	52.3	24.0
Or	33.3	30.4	8.8	11.8	0.9	25.1	34.7	28.0
Pu	30.4	27.2	10.6	27.7	14.1	39.6	50.4	14.0
Ra	40.5	37.0	8.6	21.0	0.6	14.0	20.4	34.3
TN	28.2	21.9	22.3	33.0	18.2	40.4	52.3	22.6
UP	42.0	38.1	9.4	17.9	0.7	17.2	25.3	29.4
WB	31.1	28.9	7.1	26.5	17.0	36.1	46.6	20.0
Po	28.5	23.0	19.3	52.3	..	53.0	65.6	..
Go	25.5	18.3	28.0	32.0	..	55.2	67.1	..

Sources: Mari Bhat, P.N.1994."Levels and Trends in Indian Fertility: A Reassessment" Economic and Political Weekly,29(51 &52), 3273-80

Centre for Monitoring Indian Economy, Basic Statistics: States 1994

Glossary:

AP- Andhra Pradesh, Bi- Bihar, Gu- Gujarat, Ha- Haryana, HP- Himachal Pradesh, Kar- Karnataka, Ker- Kerala, MP- Madhya Pradesh, Ma- Maharashtra, Or- Orissa, Pu- Punjab, Ra- Rajasthan, TN- Tamilnadu, UP- Uttar Pradesh, WB- West Bengal, Po-

Table 11. Female Participation in Formal Occupations in India, 1981

States	%FT in Formal Occupations	%FT in Professions	%FT	%FT Expected	Difference	Change in %FT 61-81
AP	56	62	16.9	10.3	6.6	4.4
Bi	69	72	8.9	6.9	2.0	4.0
Gu	75	81	25.0	16.9	8.1	11.6
Ha	69	76	16.1	11.5	4.6	-0.6
HP	66	76	19.2	16.5	2.7	11.1
Kar	52	63	14.9	14.4	0.5	7.9
Ker	64	78	47.1	35.9	11.2	4.8
MP	42	47	7.3	8.0	-0.7	3.3
Ma	63	73	15.8	18.1	-2.3	6.7
Or	51	56	7.9	10.7	-2.8	5.7
Pu	74	82	29.8	17.4	12.4	16.3
Ra	53	61	7.7	5.8	1.8	3.5
TN	68	77	28.9	17.8	11.1	9.4
UP	64	69	7.0	7.2	0.2	1.8
WB	55	65	9.8	15.8	-6.0	5.6
Po	61	70	28.7	24.0	4.7	17.6
Go	50	73	48.8	25.1	23.7	17.9

Sources: Population Census, General Economic Tables

Notes:

Column 2: Female teachers as a percentage of total women in formal occupations, that is occupational class 0/1, 2, and 3;

Column 3: Female Teachers as a percentage of total women in professions, that is, occupational class 0/1;

Column 4: Female participation in teaching, that is, in occupational class 15;

Column 5: Expected female participation computed on the basis of female literacy;

Column 6: Difference between columns 4 and 5; Increase in the percentage of female teachers computed using the age distribution of teachers

Table 12. Fertility, and Proportion of Female Teachers

Coefficients	Model I	Model II	Model III	Model IV	Model V
Constant A	38.3	34.97	38.99	36.52	39.18
B (t value)	0.225 (4.333)	0.166 (2.55)	0.277 (2.63)	0.200 (3.25)	0.272 (3.27)
C (t value)	0.138 (1.63)	..	0.070 (1.07)
R ²	0.822	0.667	0.834	0.740	0.843
F	69.46	30.07	35.18	42.63	37.65
No. of Observations	17	17	17	17	17

Sources: Tables 10 and 11.

Note:

Model I $CBR = A B^Y$: Proportion of Female Teachers.

Model II $CBR = A B^{Y61} Y61$: Proportion of Female Teachers in 1961.

Model III $CBR = A B^{Y61} C^{G61-81}$ G61-81: Change in the Proportion of Female Teachers 1961-81.

Model IV $CBR = A B^{Y71}$

Model V $CBR = A B^{Y71} C^{G71-81}$

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