Economic&Political WEEKLY

Causes of Fertility Decline in India and Bangladesh

Role of Community

Conventional approaches to studies on fertility decline have long assumed the primacy of the household as the prime decision-maker. Aspects of the household such as its economic standard of living, social standing, exposure to mass media, work status were some of the influential factors at work on a couple's decision on their number of children. However, individual and household level factors have been unable in several instances to explain the full course of fertility transition seen in some Indian states and Bangladesh, where in some regions fertility transition cuts across socio-economic and cultural boundaries. Gaps in understanding such trends have been as this paper suggests due to the conventional emphasis on household level variables. It argues instead for the need to look at the influence the community plays in south Asia and to understand the levels of interaction that exist at household level and at the community level.

S Mahendra Dev, K S James, Binayak Sen

I
Introduction

One of the important social changes taking place in developing countries recently is the rapid decline in fertility defying conventional theories and beliefs. The fertility decline observed in Bangladesh and many states in India, thus, still remains a paradox. The decline, in this region, had taken place in extremely difficult conditions, like, low standard of living, low literacy level, lack of modernisation, etc.

The conventional approach to the studies on fertility decline had been based on the strong premise that the decision on the number of children is taken purely privately within the household decision-making framework. Hence the question has been on how the individual decision on number of children is shaped in different settings? Both economic and social development arguments emphasised their respective roles in shaping such individual decisions. In other words, the attempt thus far was to assess the importance of individual or household level variables in influencing fertility decisions. This assessment is partly due to the fact that fertility theories are drawn mainly from the experience of western European countries. Thus household economic standard of living, its social standing, exposure to mass media,

work status, etc, are thought to be some of the influential factors driving couple's decision on number of children.

However, recent evidences suggest that the individual and household level factors are unable to explain the full course of fertility transition taking place in some of the states in India and Bangladesh. Studies observed a geographical regularity in Indian fertility transition [Guilmoto 2000]. The fertility transition in some regions cut across socio-economic and cultural boundaries. For instance, contraceptive use, in states like Andhra Pradesh and even in Bangladesh, was predominantly by those with low economic and social background. Although at a superficial level there may be a tendency to call it as poverty induced one, one need to go a little further to understand the real factors behind such important social transformation.

We, therefore, argue that the failure of the conventional approach in explaining the recent decline in fertility is due to overemphasis on household level variables. Thus, though purely private, decision on the number of children and contraceptive use are mostly shaped at the level of community in the context of south Asian region. Hence, the impelling force behind a progressive decision like contraceptive acceptance often is the level of one's interaction within the community. Thus we try to integrate the argument at the

household level and at the community level.

Our argument comes closer to the question addressed in sociological literature on micro-macro linkages between individual and community [Alexander 1988, Coleman 1990]. This question was also partially addressed in the context of demographic literature [Bongaarts and Watkins 1996, Entwisle et al 1989, Munshi and Myaux 2000]. The concept of diffusion of family planning was also based on the fact that there is a peculiar geographical pattern in fertility irrespective of socio-economic background. However, we depart from the diffusion argument in the following way. First, diffusion as a theory only speaks about the spread of birth control technology. We argue that it is not the mere information on the birth control, (which most of the women in India and Bangladesh possess even earlier) but is the sum total of one's interaction within the community that makes one to take a progressive decisions like the acceptance of contraceptive use. Secondly, the diffusion does not speak about the pathways through which the acquired knowledge on birth control is put into practice. We argue that the diffusion takes place through a social interactive framework (such as associational activities, self-help groups, informal gatherings around, etc) rather than through a purely individualised interaction. Third, while claims are being made

in the literature about the geographical diffusion by method of exclusion, the positive test for existence of such geographic effects was not carried out. In this study, we attempt to capture the geographic effects through an improved statistical analysis. However, it may be mentioned that while the statistical models point to the definitive existence of such effects, it falls short of pinpointing the policies and/or initial conditions that contributes for the making of such geographical effects.

The objective of this paper, therefore, is to bring out community as context for fertility transition like India and Bangladesh without delimiting the importance of conventional socio-economic factors. To model these effects data are drawn from Demographic Health Surveys (known as National Family Health Survey in India). As conventional statistical techniques fall short of recognising the multilevel structure under examination, household and community, we adopt an improved multilevel modelling especially to capture the community effect in fertility transition.

II
Background

With the demographic transition theory thought to be intact in explaining fertility transition in any society, developed and developing, rapid pace of fertility decline is expected only with a significant economic and social change. As a result, there will be rising costs and declining economic values of children driving couples to go for smaller families. The other major economic argument at the micro level also emphasised the conflict between quality and quantity with rising income. They also anticipated rising opportunities for women with 'time' becoming an important factor in household decision on number of children. However, as far as developing countries are concerned such modernisation or economic factors do not seem to explain the full course of fertility transition. First, the fertility decline has occurred in many countries and areas where the levels of economic development were comparatively poor. Second, the opportunities to ensure the quality of children are limited in the context of many developing countries. Third, the value of time is not particularly relevant when majority of women are illiterate and underemployed.

The empirical validity of the role of economic factors in augmenting fertility transition had been questioned with the

fertility decline observed in Kerala and other few developing countries like Sri Lanka, Costa Rica, etc. All these places had a decline in fertility unaccompanied by adequate economic development, industrialisation or urbanisation. However, invariably two striking observations are evident from the experience of these countries. First, all these countries had very high overall literacy rate and particularly high female literacy. Second, the health status of the people mainly the infant mortality rate was strikingly lower than any other places [Krishnan 1976, Bhat and Rajan 1990]. Hence attention was shifted from economic argument to a social development discourse including health improvement. This argument had been mainly accepted until the 1980s.

It was then followed by a sudden decline in fertility in Tamil Nadu and later in Andhra Pradesh without improvement in female literacy or decline in IMR. This has led to the understanding that there is no threshold level of female education or infant mortality that can be considered for augmentation of fertility decline. The same is also proved from the experience of other states in India such as Karnataka and West Bengal and also from Bangladesh.

However, the emphasis has been to bring out the importance of other household level variables other than female literacy and infant mortality. The onset of the electronic era has also persuaded the researchers to emphasise the importance of the media. It is argued that while in Kerala the print media played a crucial role, in Tamil Nadu, and to some extent in Andhra Pradesh, the access to electronic media was crucial in explaining fertility decline [Bhat 1996].

As against the household model there had been an attempt to project macro changes leading to larger fertility transition. The crux of such argument is that policies and programmes undertaken or the changes occurring in a particular geographical area would possibly have the ability to transform the entire geographical area including the fertility decisions of the couples. Hence, such change embraces all those living in a defined geographical area irrespective of the socio-economic characteristics. The pattern of fertility transition, therefore, is horizontal in nature than vertical in the sense that the place of residence that matters than the socio-economic standing. Thus, rather than the individual or household characteristics the people living in a particular geographical

region had been emphasised in such cases. A pioneering explanation lies in this context was the supply side argument considering that vigorous implementation of family planning itself could generate demand for such services [Anthony 1992, Srinivasan 1995]. Such explanations were strongly brought out in the context of Bangladesh and Tamil Nadu. However, it is doubtful as to whether supply side argument can provide a general framework to explain contemporary fertility transition. There is ample empirical evidence to the fact that the supply of contraceptive without generating adequate demand often remained unsuccessful.

In this context, the diffusion hypothesis, offered as an explanation of fertility transition also needs particular mention. Diffusion mainly speaks about the spread of birth control technology.

A similar explanation has been offered from the experience of several developing countries; 'social interaction' has been suggested as one of the powerful forces that accelerate the pace of fertility change in a society. [Bongaarts and Watkins 1996]. There can be different channels of social interaction such as spatial proximity to urban centres, extensive media facility and so on.

An alternative to such explanation but confining to macro changes was based on the conducive atmosphere of a particular geographical or rather administrative region created mainly by governmental or other efforts. For instance, in the case of Kerala social justice in political and economic policies and development strategies reflected through land reforms and increased wages to agricultural labourers [Ratcliffe 1978], success of backward class movements in the state [Anandhi 1996, Srinivasan et al 1991], populist policies of the government in Andhra Pradesh [James 1999]. A major drawback of this argument is that fertility transition is viewed as bits and pieces rather than in a general framework. It then shows that the transition in each geographical region needs to be explained uniquely. Further with fertility data available from India on smaller geographical units than state (like district) it became increasingly clear that such explanations do not hold good any more.

The other attempt has been to place the fertility transition in the larger context of history, culture, or the policies and programmes of the government. In the government programmes there were two major arguments. First was the efficient

supply of contraceptives by the government even when there is lack of sufficient demand generated in the society. This will trigger off an increase in the acceptance rate. The second was the policies of the government in the social and economic sector that trigger off social change including the fertility transition. These arguments, therefore, consider variables not at the household level but at a macro or community level. However, it is rather easy for these studies to find out some regularity between fertility decline and governmental actions but could not conclusively establish any causal link mainly due to inadequacy of statistical techniques.

However, many of the conventional factors which tried to explain fertility transition in the past become insignificant to explain dramatic decline in fertility taking place in many developing countries today. In this paper, we search for explanations beyond individual or family characteristics in explaining fertility decline.

III
Fertility Pattern

Fertility decline, in fact, can be observed in many states in India, though the accelerated pace of transition is restricted to a few states. Thus the country has now considerable regional heterogeneity in demographic characteristics. Table 1 presents total fertility rate in different states in India during 1996-98 period. Two other conventional indicators that are thought to be crucial in fertility transition are also presented in the table.

Over two child differences exist between low and high fertility states in India. The association between conventional factors and fertility is also fairly strong considering a state level analysis. The correlation coefficient of Total Fertility Rate (TFR) with Infant Mortality Rate (IMR) as well as female literacy is over 0.7 indicating strong relationship. However, such relationship does not hold good if one look at regional or sub-regional fertility levels and socio-economic variables in rapidly fertility declining states. For instance in Andhra Pradesh those districts with poor literacy rate in the coastal area like Srikakulam and Vizianagaram also recorded steep decline in fertility. The regional level data for Andhra Pradesh is presented in Table 2.

It is a bit puzzling that even with the percentage of literate as low as 23 per cent and with highest child mortality rate the north coastal region has also recorded the lowest fertility rate. The argument on the geographical contiguity in fertility decline also primarily emanates from the regional or district level data available from different states in India. This firmly underplays the importance of socio-economic indicators to trigger fertility transition.

This is not only true with regard to India but also in the neighbouring country Bangladesh. It is observed from district level studies that contraceptive use is significantly high among those districts bordering the state of West Bengal in which the same language is spoken [Amin et al 2000]. In other words, rather than socio-economic continuity, it was a sort of geographical contiguity that was observed in the case of West Bengal and Bangladesh which was explained in terms of its language, culture and history [Basu and Amin 2000].

It does not mean that fertility variation is not there between different socio-economic groups in fast fertility declining regions. Although the magnitude of difference is comparatively less, fertility differences persists in all population irrespective of the pace of decline in overall fertility. Table 3 presents total fertility rate by background characteristics of ever-married women in India, Bangladesh and Andhra Pradesh.

The table clearly brings out the fertility differentials existing by level of education, religion, caste, standard of living index, etc. Such differences persist in all the places, though, amazingly the magnitude of such variation is considerably different. While the total fertility rate of illiterates in India and Bangladesh is nearly 3.5 and 3.9 children respectively that in Andhra Pradesh is only 2.4. It may be recalled that nearly 64 per cent of ever-married women

Table 1: TFR, Female Literacy and IMR for Various States in India

States	TFR 1996-98	Female Literacy Rate, 2001	Infant Mortality Rate 1998-99
Andhra Pradesh			
Assam	2.3	56.03	69.5
Bihar	3.5	33.57	72.9
Goa	1.8	75.51	36.7
Gujarat	2.7	58.60	62.6
Haryana	2.9	56.31	56.8
Himachal Pradesh	2.1	68.08	34.4
Karnataka	2.1	57.45	51.5
Kerala	2.0	87.86	16.3
Madhya Pradesh	3.3	50.28	86.1
Maharastra	2.5	67.51	43.7
Orissa	2.5	50.97	81.0
Punjab	2.2	63.55	57.1
Rajastan	3.9	44.34	80.4
Tamil Nadu	2.2	64.55	48.2
Uttar Pradesh	4.0	42.98	86.7
West Bengal	2.3	60.22	48.7
2.3	51.17	65.8	India
2.9	54.16	67.6	

Note: IMR is for five years preceding the survey date 1998-99.
Source: TFR and IMR data are from National Family Health Survey, 1998-99 while Female literacy is from census of India (20001).

Table 2: TFR, Female Literacy and IMR for Different Regions of Andhra Pradesh

Region	TFR (0-9 Years Preceding the Survey, 1992-93)	Percentage of Literate Ever-Married Women (13-49 years)	Child (under Age 5) Mortality, Approximately for 1986-88 Period
North Coast	2.9	23.1	148
South Coast	3.0	41.0	117
Rayalaseema	3.7	22.7	132
Telangana	3.4	31.0	96
Godavari depression	3.0	26.5	114
Andhra Pradesh	3.2	31.3	117

Note: The following are the districts belonging to each of these regions.
North coast: Srikakulam, Vizianagaram and Visakhapatnam.
South coast: East Godavari, West Godavari, Krishna, Guntur, Prakasam and Nellore.
Rayalaseema: Chittoor, Cuddapah, Anantapur and Kurnool.
Telangana: Mahabubnagar, Rangareddy, Hyderabad, Medak, Nizamabad, Adilabad and Nalgonda.
Godavari Depression: Karimnagar, Warangal and Khammam
Source: Bhat and Xavier (1999).

in Andhra Pradesh is illiterate according to the National Family Health Survey, 1998-99. The fertility differentials are substantially smaller by different background characteristics in the state. Surprisingly, both households with low and medium standard of living have the same total fertility rate. However, in India and Bangladesh the differences between different educational groups in fertility rate are sizeable.

IV
Conventional Factors Influencing Fertility Decline

Table 4 presents some of the socio-economic and health indicators and total fertility rate in India and Bangladesh and some of the Indian states where there had been a rapid decline in fertility in the 1980s and 1990s.

Some important conclusions can be directly drawn from this table. First, notwithstanding the significant variation in socio-economic circumstances there has been a significant reduction in fertility in these states. Bangladesh's poverty level is twice as high as India, but the observed level of fertility for the latest available years displays an identical scenario. The same applies when fertility levels are compared among the rapidly fertility-declining states. The head-count index of poverty varies from 15 per cent in Andhra Pradesh to 27 per cent in West Bengal with nearly identical TFR. In short, there has been a very substantial decline in fertility in the context of the low level of per capita income and high level of income-poverty. This is also observed with regard to urbanisation or percentage of workers outside agriculture. Female literacy seem to have a major role in Kerala and to some extent in Tamil Nadu but not in other states like Andhra Pradesh, Karnataka or Bangladesh where the rates are still quite low. Even infant mortality rates are quite high in many states, judged by the standard of Kerala, where the fertility transition is observed in the last two decades.

The relationship between fertility and its determinants has been examined using regression analysis for the above states using district level data from the 1991 Census [Census of India 1991]. For Bangladesh we have used the district-level database developed for the *Bangladesh Human Development Report 2000* carried out by Bangladesh Institute of Development Studies (BIDS). The results of the

bi-variate regression is summarised in Table 5.

It is clear from the table that many of the socio-economic variables important in explaining variation in fertility at community/district level earlier turned out to be insignificant in many states and regions for the 1991 census year. For instance, female literacy was not found important in states like Kerala, Tamil Nadu and Andhra Pradesh. Bangladesh in this respect shows similar pattern as West Bengal. It is understandable in the case of Kerala as female literacy is nearly universal and there is no significant difference across districts. The variations in female literacy in Andhra Pradesh and Tamil Nadu are, in fact, striking.

In a nutshell, though relevant, the conventional socio-economic factors become poor predictors of contemporary fertility transition. Rather the evidence points to the importance of particular geographical area in fertility transition. For instance, in the case of fast fertility declining states like Andhra Pradesh, none of the conventional socio-economic factors seem particularly relevant for explaining district level fertility variation. However, even with considerable adversities the north coastal districts in the state underwent rapid pace of fertility decline. This leads us to understand more on the geographical dimension of fertility transition. The major

explanation until today on the geographical analysis of fertility was the diffusion theory.

V
Concept of 'Diffusion'

The essence of diffusion argument is that birth control is seen as an innovation that spreads from person to person, from group to group and region to region [Van De Kaa 1996]. Obviously, the major evidence on diffusion is garnered from western Europe. The Princeton European Fertility Project and other similar historical studies have established that fertility transition occurred within rather than across linguistic boundaries [Coale and Watkins 1996]. However, the recent emergence of interest in diffusion is primarily the result of decline in fertility in many less developed countries within a brief time span. This decline occurred with little or no change in the conventional economic and social indicators. This unprecedented decline in fertility in less developed countries unrelated to economic and social factors led Retherford (1985) and later Cleland and Wilson (1987) to emphasise the role of diffusion process of family planning. They cannot, however, distinguish the effect of spread of knowledge and ideas from the structural determinism [Van De Kaa 1996].

Table 3: TFR by Different Background Characteristics in India and Bangladesh

Characteristics	Total Fertility Rate		
	India 1996-98	Andhra Pradesh 1996-98	Bangladesh 1996-97
Residence			
Urban	2.27	2.07	2.10
Rural	3.07	2.32	3.43
Education			
Illiterate	3.47	2.35	3.93
Literate, < middle complete	2.64	2.22	3.27
Middle school complete	2.26	1.94	3.01
High school and above	1.99	2.20	2.12
Religion			
Hindu	2.78	2.20	
Muslims	3.59	2.53	
Christian	2.44	2.53	
Sikh	2.26		
Caste/tribe			
Scheduled caste	3.15	2.51	
Scheduled tribe	3.06	2.75	
Other Backward Classes	2.83	2.26	
Other	2.66	2.00	
Standard of living index			
Low	3.37	2.29	
Medium	2.85	2.32	
High	2.10	1.99	
Total	2.85	2.25	

Source: For India and Andhra Pradesh the data is from National Family Health Survey 1997-98 reports and for Bangladesh from Demographic Health Survey, Bangladesh 1996-97 report.

There are several types of diffusion: social, geographic or both [Bocquet-Appel and Jakobi 1998]. Social diffusion occurs through different means, education, mass media, government efforts and so on. It is yet to establish clearly which ,of these programmes pay the most dividends in terms of fertility reduction. However, the essence of diffusion argument primarily lies in geographical diffusion process than the social diffusion.

The interest, in recent years, has been mostly to understand the geographical diffusion process. Geographical diffusion, in a way, reveals the possibility of fertility decline even among underprivileged (both economically and socially) if a woman happened to live in a particular geographical area. There are two pathways by which geographic diffusion embraces a particular area – (i) Social learning (ii) Social Influence (Montgomery and Casterline 1998). Social influence refers to the power that individuals exercise over each other through authority, deference and social conformity pressure [Montgomery and Casterline 1998]. Although the possibility of government authority in the implementation of family planning is often talked about in Indian context, it is now largely regarded that cohesion does. not play a major role in family decisions. Social learning essentially describes a process by which the individual learns from his neighbours' technology. That is, the information or behaviour of one person can have spillover effects on the motivation of another. This can have either positive or negative impact [Montgomery and Casterline 1998].

It is not yet clearly understood the different pathways by which diffusion process operates in a particular geographical area. Diffusion also does not speak about the pace of adoption of birth control

technology and why some persistently ignore neighbour's experience [Munshi and Myaux 2000]. Bongaarts and Watkins (1996) concluded that social interaction is a critical process in fertility transition. Based on the study conducted in Kenya they argued that much of social interaction on a day-to-day basis occurs in the context of personal network, the building blocks of communities.

VI
Rethinking Diffusion

In light of the above discussion there is a need for rethinking on the diffusion model as currently discussed in the literature. We argue that the defining diffusion purely in terms of spread of birth control technology from centre to periphery ignores the wider context of social change occurring in south Asian Societies. Thus we define diffusion process in a larger context of individual-community interaction, closer to one put forward by Bongaarts and Watkins (1996). Though purely private, decision on the number of children and contraceptive use are often shaped by one's interaction within the community.

The influence of community on individual behaviour suggests that the community often has a major role to play in certain private decisions. Due to various constraints and societal attitude woman as an individual would be unable to take a decision on acceptance of modern contraception. On the contrary, becoming a part of larger groups provides them an opportunity to discuss and learn from other's experience and take progressive decisions. Bongaarts and Watkins (1996) observed that social influence was a critical factor in maintaining high fertility in may societies. Social interaction gives a social approval for certain individual behaviour.

The groups, however, are not formed with an objective to promote contraceptive use. However, many of such programmes target women. The experience of India and Bangladesh suggest that the main channels of social interaction are self-help groups. These groups were created with a completely different motive. However, the existence of such groups is also expected to have a major impact on those decisions like contraceptive acceptance. In India, for instance, efficient functioning of self-help groups can be observed in those states which is undergoing rapid fertility transition.

Table 5: Results of Bi-variate Regression of TFR on Selected Socio-Economic Variables for 1991

Country/State	Female Literacy	Female Working Participation	Female Working in Secondary and Tertiary Sector	Percentage of Pucca House	Percentage of Urban Population	Infant Mortality Rate
Bangladesh	*	-	-	*	*	*
India	*	*	*	*	*	*
Andhra Pradesh	-	-	-	-	-	-
Karnataka	*	-	-	-	-	-
Kerala	-	-	-	-	-	-
Tamil Nadu	-	-	-	*	*	-
West Bengal	*	-	-	*	*	*

Note: * Significant at 5 per cent level. – Not significant .

Source: For India and states from Census of India (1991) and for Bangladesh computed using data base developed for the Bangladesh Human Development Report 2000.

Table 4: Conventional Factors Influencing Fertility Decline

Country/States	Headcount index (Per Cent)	Percentage of Urban Population	Percentage of Female Literates	Percentage of Female Workers	Percentage of Women not Exposed to any Mass Media	Percentage of Workers Outside Agriculture	IMR	TFR
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Bangladesh	46.0	20.0	41.50	15.0	54.3	63.1	65	3.3
India	26.1	25.7	54.16	22.3	40.3	32.5	71	3.3
Andhra Pradesh	15.8	26.9	51.17	34.3	23.7	28.8	63	2.5
Karnataka	20.0	30.9	57.45	29.4	21.4	32.6	53	2.5
Kerala	12.7	26.4	87.86	15.8	11.5	52.0	12	1.8
Tamil Nadu	21.1	34.2	64.55	29.9	20.3	38.2	53	2.0
West Bengal	27.0	27.5	60.22	11.2	38.6	43.5	55	2.6

Note: Latest available data.

Source: For India column no 2 is from Planning Commission estimates for 1999-2000, 3, 5 and 7 is from Census of India (1991), 4 from Census of India (2001), 6, 8 and 9 is from National Family Health Survey 1998-99. For Bangladesh these figures are compiled as part of the Bangladesh Human Development Report (2000).

The self-help group, DWCRA, for instance, is an undoubted success story in Andhra Pradesh and formed a central element in the state's community mobilisation. Nearly 400,000 DWCRA groups are formed in the state constituting nearly 40 per cent of total groups in all India. Most of these women are of younger ages with average age around 35 and also belong to socio-economically weaker sections of the society. Not only this, such groups helped women to earn additional income but also would have helped them in providing a progressive outlook to such issues on small family size and contraceptive use. The evaluation survey conducted in Andhra Pradesh showed that one of the main issues discussed in the groups is health/sanitation and family planning [Org-Marg Research Ltd 2000].

In the case of Bangladesh, the Grameen Bank of Bangladesh is perhaps the best-known example of promoting self-help groups and there are millions of beneficiaries of which nearly 95 per cent are women. There are also other credit advancing organisations like Bangladesh Rural Advancement Committee (BRAC), Bangladesh Rural Development Boards (BRDB), etc. These programmes demonstrated that it is possible for group based lending programmes to generate sustainable livelihoods for the poor. These groups meet weekly repayment of their loans thus enhancing the interaction within the community. Further, these programmes encourage their members to have small families and educate their children.

VII
Measurement Issues

Although the existence of community level process in fertility decline is now largely accepted, the major question is how this can be effectively measured or understood. By plotting fertility variation in different areas, it is possible to assess the existence of geographical pattern in fertility. However, such attempts provide only an indication of geographical effect. The attempt in India using data at the district and village level has clearly revealed spatial contiguity in the fertility transition [Guilmoto 2000, Guilmoto and Rajan 2001].

There are two measurement issues this paper confronts. First it needs to assess after controlling for conventional socio-economic factors, whether there is any significant geographical/community ef-

fect? Second, if such geographical effect persists, there is a need to test the importance of community level interaction as a possible explanation for fertility transition. Hence, the determinants to fertility are hypothesised to operate at two levels: individual-level (such as women's socio-economic status) and village-level (the geographical/community factor). For instance, a village could have high (low) levels of fertility simply because it has a concentration of certain types of women who anyway are likely to report high (low) levels. In such cases, the variation between villages would simply be an artefact of its population composition. However, if differences between villages remain, even after considering all possible individual factors that influence fertility (poverty, illiteracy, religion, caste and so on) then it suggests that over and above the individual factors, there are 'village-effects'. Consequently, it assesses whether or not living in one village as compared to another has an impact on women's fertility decision. Conventional techniques fall short of recognising the 'multilevel' structure of the issue under examination. However, in recent times multilevel modelling procedures have allowed us to address these concerns in a robust manner [Goldstein 1995].

Data and Methodology for the Multilevel Model

This paper adopts the multilevel technique to quantitatively test the presence of geographic effects. The data for the study are drawn from the Demographic Health Surveys (DHS) conducted in India and Bangladesh. In India the survey is known as National Family Health Survey. As the latest round data (1998-99) is not yet made available, we used 1992-93 data for India and correspondingly 1993-94 data for Bangladesh.

Indian NFHS data contain different modules, household, women and village. We have combined both women and village module for the multilevel analysis. The variables on village community interaction are taken from the village module. As a result, for India data consists only for rural areas. However for Bangladesh only women's module is used for the analysis.

For the multilevel analysis, a two-level structure of women at the level-1 nested within the villages at the level-2 is considered for India. For Bangladesh, however,

three level structure women at the level-1 nested within primary sampling unit (PSU) at the level-2 and PSU nested within the district at level-3 is considered for Bangladesh. District level is omitted in India as it is not considered in the sampling frame of Indian National Family Health Survey.

The number of children born to each of the ever-married women is considered as dependent variables. Most of the conventional socio-economic variables are also considered here. Due to high correspondence between female and male education, only female educational level is considered. For female education the reference category is taken as high school and above for India and secondary and above for Bangladesh. Hence, the coefficient for illiterate or primary level education indicates the differences between them and a high school level and above educated women. Also religion, caste, media exposure work participation, etc, are also considered for the analysis.

We have also tested for a few village level variables for India representing group interaction such as existence of women's associations in the villages or the number of group meetings of family planning held in villages to test our basic hypothesis on the importance of community impact on the fertility decision. A variable that may roughly indicate the conventional diffusion argument, distance to the nearest town from the village is also included as a village level predictor. This is based on the assumption that closeness to the town provides easy passage to the knowledge on birth control technology. As village module is not available for Bangladesh no variable is tested at the village and district level.

As already pointed out, the important question addressed here is how far various household level variables are capable of explaining fertility variation in India and Bangladesh. After duly accounting for the household level variables, whether there is any significant variation remains at the village or district level.

Discussion of the Results

Table 6 presents results of a multilevel model for India and Bangladesh. Most of the socio-economic factors at the household level are significantly associated with the number of children both in India and Bangladesh. The contraceptive use both in India and Bangladesh turned out to be

positively associated with number of children born. This was probably because women in these countries use contraception mainly as a permanent method after achieving their desired family level. Illiterate and primary educated women have nearly half the children higher than high school and above educated women in India. Nearly similar picture is found in Andhra Pradesh and Bangladesh.

As these results are fairy well known, where the present analysis makes a departure and improves is by estimating the 'district effect' and 'village effect' on women's fertility. Random part of the model suggests that individual/household level factors do not account for the total variation in the fertility. There is a significant variation between districts in Bangladesh and between primary sampling unit (PSU) variations in both the countries. In other words, poor, illiterate, scheduled caste, etc, living in a particular village or district seems to have significant impact on the fertility performance of the women. This evidence indirectly suggests the importance of geographical region. This evidence is crucial as it makes a case to develop contextual explanations to explain variation in fertility levels

As already pointed out some of the contextual variables are considered for the Indian data to test whether the existence of a women's group or group level activities conducted in the village last one year have any impact on the fertility performance of the women in that village. These two variables also show a significant relationship with fertility. However, the variable on the distance to the nearest town considered for measuring the conventional diffusion argument turned out to be insignificant.

Thus the analysis demonstrated that it is important to distinguish different levels while understanding the complex social process such as fertility variation. A lot remains to be understood at the community levels, as village level variation still remains significant after taking into consideration the group interaction variables.

Conclusions

The recent fertility transition in many developing countries is increasingly getting attention as it does not conform to economic or social development argument. Most of the conventional household level theories become poor predictors of recent fertility decline. Hence the explanations

were largely confined to either regional specificities or the often-debated diffusion theory arguing the spread of birth control technology. However, both these arguments rather than finding out some regularity could not conclusively establish a causal link with fertility transition. This was also partly due to non-availability of proper statistical tools to establish such link.

This paper, however, argues that in the context of developing countries like India and Bangladesh the decision on contraceptive acceptance are often shaped at the community level. Being a part of community woman as an individual looks at the community response while taking a progressive decision like contraceptive acceptance. If the social response is favourable a woman would accept family planning irrespective of socio-economic status. We also argued that the individual decisions are formed through a social interactive process within the community. Hence better the opportunity to have community interaction, higher will be the

contraceptive use in that community irrespective of the development in that particular geographical area. We also tried to measure this relationship through an improved multilevel modelling.

The results showed, although substantial variation in fertility remains at the household or women level, there is significant unexplained variation at the village/district level. This confirms the fact that conventional theories are incapable of explaining the recent rapid course of fertility transition in many developing regions. We have also tested for the impact of community interaction variable on the fertility decisions and found it significant. This gives credence to our argument that the pace of fertility transition could be augmented through proper channels of community interaction within a geographical area.

However, it should be mentioned here that the village level factors considered here are only instruments in explaining community interaction. More needs to be understood as how some decisions are

Table 6: The Multilevel Regression Coefficient and Standard Error of Each Independent Variable on Children Ever Born in India and Bangladesh

Dependent=Children Born Variables	India (1992/93) No. of cases=52843	Bangladesh (1993/94) No. of cases=9634
Women level predictors		
Age of female in years	0.367 (0.005)*	0.228 (0.011)*
Age Square	-0.004 (0.000)*	-0.001 (0.000)*
Male children died	0.937 (0.011)*	0.921 (0.023)*
Female children died	1.008 (0.011)*	0.973 (0.023)*
Modern Contraceptive Use (1=yes; 0=No)	0.562 (0.014)*	0.681 (0.031)*
Women illiterate (reference category= High school & above for India and Secondary and above for Bangladesh)	0.733 (0.030)*	0.453 (0.046)*
Primary Education for mothers (reference Category same as in illiterate)	0.582 (0.031)*	0.528 (0.047)*
Middle School for mothers (reference Category same as in illiterate)	0.331 (0.036)*	–
Muslim (1=Muslim; 0=others)	0.554 (0.026)*	0.375 (0.047)*
SC/ST (1=SC/ST; 0=others).	0.140 (0.017)*	-
Media Exposure (1=Yes; 0=No)	-0.121 (0.014)*	-0.162 (0.031)*
Working mothers (1=yes; 0=No)	-0.123 (0.014)*	-0.391 (0.04)*
Standard of Living Index	-0.004 (0.001)*	-
Member of a Self Help Group (1=Yes; 0=No)	-	0.060 (0.037)
Living in urban areas (1=Yes; 0=No)	-	-0.221 (0.056)*
Village Level Predictors		
Women's Association (1=Yes; 0=No)	-0.099 (0.024)*	-
Number of Group meetings on Family Planning last one year	-0.005 (0.001)*	-
Distance to the Nearest Town	0.001 (0.001)	-
Random Part		
Constant	-5.360 (0.087)*	-3.886 (0.172)*
Level-3 Between District Variation	–	0.038 (0.012)*
Level-2 Between PSU Variation	0.143 (0.007)*	0.055 (0.011)*
Level-1 Between Women Variation	1.922 (0.012)*	1.875 (0.027)*

Note: Figures in the bracket are the standard errors. Media exposure is the exposure to TV/Radio at least once a week or going to cinema at least once a month.
Standard of living index is calculated using asset holding and facilities at the household. For details of its estimation see National Family Health Survey (2000). However, finally the index value is considered as such and did not classify into three like in NFHS-2 report.
* Significant at 5 per cent level.

formed at the community level especially of those of small family size. This paper while emphasising the role of community interaction also cautions jumping into wild conclusion. Probably this paper emphasises more on the importance of community but more needs to be explored at that level thus giving a new mandate for social research from household to community. [EPW]

Address for correspondence:
smdev@hd2.dot.net.in

[This paper is based on a large research study on the causes of fertility decline in India and Bangladesh sponsored by South Asia Network of Economic Research Institutes (SANEI), New Delhi. We sincerely acknowledge the comments received from the participants of two seminars at third annual conference of the SANEI at New Delhi, August 28-31, 2001 and Centre for Economic and Social Studies, Hyderabad.]

References

Alexander, Jeffrey C (1988): *Action and Its Environments: Towards a New Synthesis*, Columbia University Press, New York.

Anandhi, S (1996): 'Reproductive Bodies and Early 20th Century Tamil Nadu', Paper presented at 26th Interdisciplinary Research' Methodology Workshop on Rethinking Indian Modernity: The Political Economy of Indian Sexuality, Madras Institute of Development Research, Madras.

Antony, T V (1992): 'The Family Planning Programme: Lessons from Tamil Nadu's Experience', Paper presented at the symposium on India's Development in the 1990s, Centre for Policy Research, New Delhi.

Bangladesh Institute of Development Studies (2001): 'Bangladesh Human Development Report 2000: Fighting Human Poverty', Bangladesh Institute of Development Studies, Dhaka.

Basu, Alaka Malwade and Sajeda Amin (2000): 'Conditioning Factors for Fertility Decline in Bengal: History, Language Identity and Openness to Innovations, *Population and Development Review*, 26 (4), pp 761-94.

Bhat, P N M (1996): 'Contours of Fertility Decline in India: A District Level Study Based on the 1991 Census', Discussion paper series No 13, UNDP Project, Centre for Development Studies, Thiruvananthapuram.

Bhat, P N M and S Irudaya Rajan (1990): 'Demographic Transition in Kerala Revisited', *Economic and Political Weekly* 25, (September 1-8): 1957-80.

Bhat, P N M and Francis Savier (1999): 'Findings of National Family Health Survey: Regional Analysis, *Economic and Political Weekly*, October, 16-23, pp 3008-32.

Bocquet-Appel, Pean Pierre and Lucienne Jakobi (1998): 'Evidence for a Spatial Diffusion of Contraception at the Onset of the Fertility Transition in Victorian Briton, *Population*, (Special issue), pp 181-204.

Bongaarts, John and Susan Cotts Watkins (1996): Social Interactions and Contemporary Fertility Transition, *Population and Development Review*, 22 (4): 639-82.

Census of India (1991): 'District Level Estimates of Fertility and Child Mortality for 1991 and Their Inter Relations with Other Variables', Occasional Paper No 1 of 1997, Registrar General of India, New Delhi.

Census of India (2001): 'Provisional Population Totals, India, Paper 1 of 2001', Registrar General of India, Delhi.

Cleland, J and C Wilson (1987): 'Demand Theories of the Fertility Transition: An Iconoclastic View', *Population Studies*, 41 (1), pp 5-50.

Coleman, James S (1990): *Foundations of Social Theory*, Cambridge, MA: Harvard University Press.

Demographic Health Survey (1997): *Bangladesh, 1996-97*, National Institute of Population Research and Training, Dhaka, Mitra Associates, Dhaka and Macro International, Maryland.

Entwisle, Barbara, John B Casterline and Hussein A-A Sayed (1989): 'Villages as Contexts for Contraceptive Behaviour in Rural Egypt', *American Sociological Review*, 54 (6), pp 1019-34.

Goldstein, H (1995): *Multilevel Statistical Models* 2nd edition, Arnold, London.

Guilmoto, Christophe Z (2000): 'The Geography of Fertility in India (1981-1991) 'in C S Guilmoto and A Vaguet (eds)', *Essays on Population and Space in India*, French Institute Pondicherry, Pondicherry.

Guilmoto, Christophe Z and S Irudaya Rajan (forthcoming): 'Half a Century of Fertility Transition in Indian Districts, 1951-2001', *Population and Development Review*.

James, K S (1999): 'Fertility Decline in Andhra Pradesh: A Search for Alternative Hypotheses', *Economic and Political Weekly*, 34 (8), pp 491-99.

Krishnan, T N (1976): 'Demographic Transition in Kerala: Facts and Factors', *Economic and Political Weekly* 11, No 31-33(August): 1203-24.

Montgomery, Mark, R and John B Casterline (1998): 'Social Networks and the Diffusion of Fertility Control', Working Paper No 119, Population Council, New York, New York.

Munshi Kaivan and Jacques Myaux (2000): 'Social Change and Individual Decision: With an Application to the Demographic Transition', University of Pennsylvania (unpublished).

National Family Health Survey (1995): *India, 1992-93*, International Institute for Population Sciences, Bombay.

– (NFHS-2) (2000): *India, 1998-99*, International Institute for Population Sciences, Mumbai and ORC MACRO, Maryland.

Org-Marg Research Ltd (2000): 'Consultancy on Strengthening of Self Help Group in Andhra Pradesh – SWOT Analysis of the Groups Surveyed in Andhra Pradesh (Sponsored by Department of Rural Development, Government of Andhra Pradesh, Hyderabad).

Pitt, Mark, M, Shahidur R Khandker, Signe-Mary Mckernan and M Abdul Latif (1999): 'Credit Programmes for the Poor and Reproductive Behaviour in Low Income Countries: Are the Reported Casual Relationships the Result of Heterogeneity Bias', *Demography*, Vol 36, (1), pp 1-21.

Ratcliffe, John. (1978): 'Social Justice and Demographic Transition: Lessons from Kerala State', *International Journal of Health Services* 8, No 1:123-44.

Retherford, R D (1985): A Theory of Marital Fertility Transition', *Population Studies*, Vol 39 (2), pp 249-68.

Sajeda, Amin, Alaka Malwade Basu and Rob Stephenson (2000): 'Spatial Variation in Contraceptive Use in Bangladesh: Looking Beyond the Borders', Working Paper No 138, Policy Research Division, Population Council, New York.

Srinivasan, K (1995): *Regulating Reproduction in India's Population: Efforts, Results and Recommendations*, Sage Publication, New Delhi.

Srinivasan, K et al (1991): 'The Effect of Family Planning Components on Contraceptive Acceptance in Four Indian States', *International Family Planning Perspectives*, No 1:14-24.

Van De Kaa, D J (1996): 'Anchored Narratives: The Story and Findings of Half a Century of Research into the Determinants of Fertility', *Population Studies*, 50, (3) pp 389-43.

REVIEW OF AGRICULTURE
July 27, 2002

Reforms in Agricultural Extension: New Policy Framework — *Rita Sharma*

Crisis in Agrarian Economy in Punjab: Some Urgent Steps — *H S Sidhu*

Rice Production in Punjab: Systems, Varietal Diversity, Growth and Sustainability — *Karam Singh, Sajla Kalra*

Agriculture in India and Pakistan, 1900-95: A Further Note — *Takashi Kurosaki*

Sagging Agricultural Commodity Exchanges: Growth Constraints and Revival Policy Options — *K G Sahadevan*

Indian Agricultural Commodity Futures Markets: A Performance Survey — *Gopal Naik, Sudhir Kumar Jain*

For copies write to
Circulation Manager
Economic and Political Weekly
Hitkari House, 284, Shahid Bhagatsingh Road, Mumbai 400 001