

## **CHAPTER FIVE**

# **THE CONTEXTUAL DETERMINANTS OF FERTILITY IN NORTH-EAST INDIA: A DISTRICT-LEVEL ANALYSIS**

### **5.1. INTRODUCTION**

In the previous chapter, we examined the proximate as well as the background determinants of fertility in NER using state-level data. A key finding from the earlier chapter was the possibly greater importance of *socio-economic* factors (indicated for instance by female literacy rate and early childhood mortality rates) than that of purely economic ones (such as per capita state domestic product or the degree of urbanization), in shaping the process of fertility transition. However, given the almost universal knowledge but relatively lesser use of contraception (and high *wanted* fertility) evinced by a few states in the region, one cannot but wonder if socio-cultural or even political factors might also possibly be at work here. Which set of factors-economic, social, cultural or political, might be influencing fertility largely during this stage of the fertility transition in NER? With the aim of unraveling the answer to this question, we embark on an in-depth investigation of the various contextual factors influencing fertility in NER using district level panel data for the period 1991 and 2001.

This chapter is organized as follows. In the subsequent section, we briefly outline the various (and sometimes contending) perspectives on fertility transition and explore the evidence on the factors behind the fertility decline (or its lack thereof) from

research on India and its major states. Section 5.3 examines the relevance of these perspectives and their variants in the specific context of NER, and discusses the pertinent issues in the context of fertility transition in the region. In Section 5.4, we outline the method of analysis adopted and briefly explain the various statistical models (regression models) used in the analysis together with a description of the variables used in the study. Section 5.5 presents the findings from the data analysis. Section 5.6 is devoted to a discussion on the principal implications of the results and concludes.

## **5.2. THE DRIVERS OF FERTILITY DECLINE: PERSPECTIVES AND EVIDENCE FROM INDIA**

### ***5.2.1 Theories of Fertility Decline: An Overview***

A rather intriguing feature of the subject area of fertility is an unmistakable lack of consensus on a single theory that can explain the phenomenon of fertility transition, with a level of generality that would make it applicable to all regions and all times. To a large extent, this is attributable to the fact that fertility is a subject matter that lends itself to interpretation from the perspective of diverse disciplines such as economics, sociology, anthropology, biology, psychology and history. Hence, an examination of the empirical literature on the subject reveals numerous studies that have utilized factors drawn from these various (and sometimes competing) explanations in explaining fertility transitions.

Perhaps the broadest (if not the most comprehensive) theory in terms of incorporating the possible factors explaining the process of demographic transition, is

the '*demographic transition theory*'.<sup>44</sup> Notestein (1945) is credited for the formulation of the theory in its most explicit form, though the idea can be found in the work of earlier writers (Carr-Saunders 1922, 1964/1936; Davis, 1945; Thompson, 1929). Although in the initial formulation (for instance, in that by Notestein), it was perhaps not so much of a *theory*, but an exposition of the regularities observed in the population transitions of historical Europe, it gradually assumed the position of a theory that would possess universal applicability and hence some measure of predictive power. The classical demographic transition theory places socio-economic development at the centre of the changes that lead to a reduction in fertility among various populations. In traditional agricultural societies, fertility is high to offset the high mortality rates and thus ensure the survival of the species. However, with socio-economic development in the form of urbanization, increasing education, and increasing role of the State in the provision of various basic services including health and social security, there occurs a two-fold change. On the one hand, the decline in mortality and the increase in child survival lead to a downward revision of the desired number of children, while on the other, increasing incomes as well as employment opportunities (especially for women) together with other alternatives to old-age security to children, lower the benefit and increase the cost of additional children, thus strengthening the desire for lower number of offspring. This change in attitude among

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<sup>44</sup> This also necessarily means that the demographic transition theory does not examine the nuances of the various factors determining fertility mentioned, but provides a broad sketch of the possible factors and the ways in which they might be influencing fertility. It was left for later researchers to clarify and point out the various finer details of the mechanisms operating on reproductive behaviour. These attempts have resulted in formulation of hypotheses that can be easily subjected to empirical verification and testing.

couples, leads to increase in the demand for family planning services and with its adequate supply, fertility begins to decline.

However, Notestein (1945) observed that, as compared to mortality, fertility was much less responsive to the process of modernization. He noted that societies that have experienced high mortality in the recent past are ingeniously arranged to obtain the requisite births. Their religious doctrines, moral codes, laws, education, community customs, marriage habits, and family organizations are all focused towards maintaining high fertility and concluded that reduction in fertility requires a shift in social goals from the survival of the group to those directed toward the welfare and the development of the individual.

Even though, the demographic transition theory is infused with ideas of ideational and institutional changes as indicated by the conclusion of Notestein with respect to fertility transition, these factors were perhaps not emphasized as much as the socio-economic changes when explaining the actual process through which fertility transition would transpire. It is also true that the focus of this theory is on factors that operate largely at the level of the individual and the household. Hence, the empirical formulations and testing of the theory has tended to include factors that clearly belong to the socio-economic category, and primarily are micro-economic in nature.

Perhaps the purest strain of theory that attaches overwhelming importance to socio-economic determinants of fertility is the 'demand' theory of fertility decline. It is based on the presumption that the theory of the demand of consumer durables can be used as a framework for analyzing the demand for children. The earliest formulation of this theory can be found in the work of Leibenstein (Leibenstein, 1957). Among others, the development of what came to be known as new home economics of the Chicago

school is most prominently associated with the work of Gary Becker (Becker, 1960; Becker and Lewis, 1973). The demand/economic theory of fertility have been succinctly summarized by de Bruijn (2006) “This micro-economic approach not only involves the traditional variables of income and prices, but also the quality of children and budget constraints in terms of allocation of time and opportunity costs. Given these variables, households are assumed to produce a bundle of consumer commodities—including children—in accordance with the maximization of household utility. The model thereby links fertility decisions to other household decisions, including labor force participation and consumption. The notion of child quality became a key factor in Becker’s work to account for the inverse relation between income and number of children as experienced in the fertility transition.” (de Bruijn, 2006: 555).

Other model specifications of similar inclination have tried to elaborate on the relationship between fertility and various other dimensions of socio-economic change such as increase in the real wages of women, rise in the real income of men and increase in the proportion of women in the labour force. However, attempts to establish a link between the preferences for children and child-rearing in the context of preferences for consumer goods, other goods, the use of time for work and leisure, and parents’ aspirations, can also be considered to be extensions of the economic approach to fertility (Cleland and Wilson, 1987; van de Kaa, 1996).

The economic approach to fertility has been challenged on several grounds. Perhaps the strongest criticism levied is its non-applicability for developing countries, where fertility decisions might have not entered the ‘calculus’ of choice of the households and fertility might be, to a considerable extent, guided by supply-side considerations (Simmons, 1985). Hence, the demand-side theories were not completely

capable of explaining fertility behaviour in societies where industrialization and modernization were yet to begin. The Easterlin synthesis (1975, 1978), which combines the demand and supply side factors affecting fertility (as expressed in the proximate determinants framework of Davis and Blake, 1956 and Bongaarts, 1978), has been an important and influential step forward towards addressing the shortfalls of the pure demand theory of fertility. The incorporation of the supply side factors introduced the need for family planning programmes and easy access to contraceptives in reducing fertility. A major contribution of this framework is that it clarifies the pathways through which social development captured by public health, education, and urbanization affect the demand for children. Only when the supply for children would be in excess of demand, a desire to control family size would arise. Depending on the cost of fertility regulation, the couple would limit their family size.

These subsequent perspectives on fertility transition retained within them one crucial element of the demographic transition theory, namely, the emphasis on socio-economic factors in determining the timing and pace of the transition. However, later developments in the area challenged that very building block of this genre of theories. Alternatives to the economic/demand-centered theories can be broadly classified into social, ideational, and institutional theories of fertility decline.

Caldwell's social theory of intergenerational wealth flows (1982) has been considered by some researchers as the only demographic theory that can conceptually rival the conventional transition theory, particularly in the setting of less developed countries. The principal tenet of this theory is that fertility transition would take place when net flow of wealth, which is in the direction of children to parents in traditional societies, is reversed. Essentially, the flow will be reversed if the economic and

emotional primacy is withdrawn from the grip of broader family ties and is focused on the conjugal family. Most importantly, according to this theory, “the transition from high to low fertility is a product of social change with economic implications, rather than economic change alone” (de Bruijn, 2006: 561). Although, Caldwell’s theory met with some success, verifying its conclusions empirically, proved to be very difficult.

However, during the 1980s, the ideational/diffusion theories of fertility decline emerged as the strongest rival of the demand/economic theories of fertility decline. The European Fertility Project, led by Ansley Coale and colleagues, set out to empirically test the conclusions of the demographic transition theory with data from European provinces covering the nine decades (1870-1960), during which most of the fertility transitions had taken shape in Europe. The main conclusions of the study have been that (1) socio-economic conditions are weakly predictive of fertility decline, and transitions started at widely differing levels of development and (2) once a country or a region had begun transition, neighbouring countries or regions with the same language or culture followed after short delays even if they were less developed [Watkins (1986, 1987) quoted in Bongaarts, 2006]. The second proposition, which emphasizes ideational changes or diffusion of the idea of small family size, as the primary reason behind fertility declines, has been the conclusion of various other researchers on the subject as well, most rigorous among them being John Cleland and Christopher Wilson. The processes through which ideational change occurs are referred to, in the demographic literature, as social learning (that is the acquisition of information from others) and social influence, the power that individuals exercise over each through authority, deference, and pressures for social conformity (Montgomery and Casterline, 1998).

To illustrate, Cleland and Wilson (1987) found that at the societal level, fertility transition is strongly influenced by cultural boundaries (which implies that fertility transition is a function of diffusion) and associated more closely with indicators of social development (for instance parents' education), rather than economic factors such as the mode of production or women's employment.<sup>45</sup> Within culturally homogenous populations, the pervasive nature of fertility transition testifies to the diffusion of new ideas rather than micro-economic forces, which may well nigh act in different directions at the household and community level. Thus, the authors' conclude that based on the evidence of weak association between economic structure and fertility at both the micro and macro level, stronger links with culture and education (both factors facilitating spread of ideas) and the acceptance of birth-control within societies, it is the ideational and not structural changes (as emphasized in the demand theories) that are the root cause of the onset of fertility transition. Overall, it appears that based on inconclusive evidence in favour of the economic/ demand theory, the ideational theories of fertility transition emphasize that development alone is insufficient to account for the observed variations in the timing and pace of fertility transitions and social interaction has to be taken into consideration.<sup>46</sup>

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<sup>45</sup> It should however be noted here that the economic aspect of variables, such as women's employment cannot be completely disassociated from their socio-cultural counterpart. Similarly, the variables classified as social such as education can have their roots in the economic structure of society as well. To elucidate the point, though women's employment has been classified here as an economic variable, it is perhaps well-known that even if there are prospects for the employment of women, their productive role outside the household could be curtailed to a significant extent by social sanctions for deviation from the "ideal" role of a woman in society, which limits the utility of women to household work and child-bearing.

<sup>46</sup> As a specific example, the theory argues that the fertility-education relationship can indeed be caused by 'cognitive changes' rather than 'micro-economic realities'. This is borne out by the observation from a multi-national WFS study that in most of the countries, a few years of



Even though till recently, the research inclinations in fertility led to a relative abundance of micro/household level studies as compared to the ones that emphasize the wider political and institutional influences on fertility, the latter cannot be any less important than the former.<sup>47</sup> Notably, the ‘*demographic transition theory*’ (which is perhaps the most widely acknowledged theory in demographic literature) is itself infused with notions of socio-cultural and institutional changes that have to occur for the process of fertility transition to set in.

The socio-political institution theories of fertility transition find recognition primarily in the discourses of Susan Greenhalgh (1988, 1990) and Geoffrey McNicoll (1997, 2001), though the roots of this hypothesis can be traced to Malthus (McNicoll, 2001). Both authors emphasize changes in socio-political institutions, but while Greenhalgh posits that the idea of a single demographic transition (and hence fertility transition) is not tenable, demographic transitions being necessarily, temporally, culturally and institutional specific, McNicoll argues that perhaps the underlying cause of fertility transitions are the much neglected “political transitions”.<sup>48</sup> The basic argument of the author around which the hypothesis builds itself is that polity (the political-administrative structure that is the institutional manifestation of the State, which is itself a legacy of any society, along with its economy, social institutions and

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women’s schooling has been sufficient towards a shift in their preferences towards a smaller family size and it has not necessarily been associated with increased employment opportunities.

<sup>47</sup> A possible explanation as put forth by van de Kaa (1996) is that, changes in the amount and character of the demographic information available and the trends in demographic measures were (also) influential. It is also easily overlooked that the funding agencies exerted considerable pressure on the direction of research.

<sup>48</sup> McNicoll puts forth this perspective to fertility transition in the following phrase, “There is a complementary view of fertility that, in contrast (to the family and individual behaviour), has been relatively neglected. This is fertility seen as part of the core generic problem of societal management.....of how a society organizes and governs itself” (McNicoll, 2001:129).

cultural patterns), provides the overall regulatory regime (including the demographic regime) within which individuals function. McNicoll notes how the various socio-economic, cultural and ideational influences on fertility can be themselves predisposed directly and indirectly by the actions of the government. This theory explicitly recognizes that all transformations in individual behaviour, including changes in reproductive choices, are molded by the immediate social environment and that any existing social organization is itself a function of the overall administrative structure. The state has a part in determining access and opportunity in the society—social mobility, returns to effort, distributional equity—particularly through the social stratification and gender systems, thereby affecting the fertility calculus of individuals and families (McNicoll, 1998).

More importantly, the State is the vehicle for the ideological creation of its authority over various spheres of individual life. “The cultural counterpart of the centralization of authority in the early part of political development is the ideological creation of the nation-state...the state attempts to monopolize the symbols of nationhood. The state thus constructed wields these various symbols to create a potent source of identity that overlay and may eventually all but extinguish local and kin-based loyalties” (McNicoll, 2001: 149). McNicoll recognizes two exceptions to this development pattern of the state (whereby the State at one and the same time establishes itself as an indispensable part of society and designs policies for its material improvement). In one case, the State may consciously exclude many of the concomitants of development and force neo-traditional religious values. In another, ethnic or cultural groups may proclaim their desire for nationhood, “*often with acute awareness of demographic relativities within State boundaries*” (McNicoll, 2001: 149,

italics added). The relevance of the second exception then perhaps lies in the cultural frame of reference of these communities, and this necessarily extends to their reproductive choices as well.<sup>49</sup>

Interestingly enough, these competing perspectives and hypotheses have each been accepted for some population at some point in time, and sometimes even disparate theories have been tested on the same population and accepted after empirical investigation! While on one hand, each theory has its ardent supporters and a clear ‘winner’ among them is yet to emerge, on the other, the appearance of a unifying/overarching theory remains an elusive dream. Nevertheless, the result of this rather protracted debate has been the accumulation of a huge body of knowledge on the determinants of fertility, together with development of new methods of analysis as well as greater efforts towards collection of relevant data in the field. Most importantly, alongside developments on theoretical lines, there has been continuing thrust on the identification and empirical verification of such factors that are at once implied by theory and have strong policy implications. Ongoing research on the primary determinants of fertility in regions experiencing very high (or low) as well as ‘deviant’ (for instance stalled) fertility has contributed enormously to this field. Even though, providing a complete review of the empirical body of literature is beyond the scope of the chapter, in the following section, we provide a brief review of the research on the determinants of fertility decline in India and its states, thus situating the North-eastern states in its broader national context.

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<sup>49</sup> We would like to mention here that perhaps an additional outcome of the segregative proclivity of ethnic communities might be the inclination to derive utility from the welfare of the group. This may be so because various welfare and social functions of the State have to be increasingly met by the group. This has direct consequences for the fertility decisions of these communities.

### ***5.2.2 Determinants of Fertility Decline: Evidence from India***

Developing countries including India have been undergoing the process of fertility transition for almost the past quarter of a century-albeit at varying paces and under different circumstances. The TFR of the developing countries dropped from 6 births per woman in the late 1960s to 2.9 births in 2000-05 (Bongaarts, 2008). However, among the population-wise largest countries that are yet to reach replacement level fertility, the decline was relatively slow in India during the period 1970 to 1997, remaining slightly above 3 per woman in 1997 and declining to 2.7 births per woman in 2005.

India (the most populous country in the world, second only to China, with a population of 1.21 billion in 2011) embarked on its journey to low fertility from the latter half of the 1960s. Even though direct fertility estimates are not available for the period prior to 1967 (the year of commencement of the Sample Registration System), indirect estimates based on age data derived from the decennial censuses reveal that the period 1966-71 marked the beginning of the fertility transition in India (Adlakha and Kirk, 1974; Rele, 1987). The TFR remained stable at around 6 births per woman during the 1950s and first half of the 1960s. Thereafter, there was a relatively fast decline in fertility rates, from 5.78 during 1966-71 to 5.37 during 1971-76 and further to 4.65 during 1976-81 (Rele, 1987). These figures are in concordance with the estimates provided earlier by the Panel on India (Bhat, Preston and Dyson, 1984).

Rele (1987) argues that the fertility decline in India witnessed from 1966 onwards, might have been a result of the major shift in the focus of the national family

planning programme (introduced in 1952) from a clinic based to an extension approach in 1963, and the greater emphasis on family planning as indicated by the establishment of a full-fledged Department of Family Planning within the Ministry of Health and Family Welfare in 1966. This was accompanied by significant increases in expenditure on the programme itself. Based on their analysis of the proximate determinants of fertility, Jain and Adlakha (1982) found that for the period 1972 to 1978, fertility decline was primarily caused by changes in age-specific fertility rates. Whereas, the reduction in fertility in the younger age groups reflected the effect of rising age at marriage, substantial declines in fertility among women over 25 years of age were brought about by increased use of contraceptive methods. Visaria (1999) using data from the first round of the NFHS (1992-93), as noted earlier, similarly concluded that greater use of contraception was the primary reason behind the fertility decline at all-India level as well as the major southern states where the decline was well underway and had already reached replacement level in a couple of states. However, given the huge demographic, socio-economic and cultural diversity within the subcontinent, a far greater volume of research exists on fertility differentials and their explanation at the regional and state level in India.

One of the remarkable features of India is the presence of a broad north-south differential in demographic performance since at least the beginning of the 1960s that, though tapering, seems to have persisted overtime. One of the earliest studies aimed at explaining the north-south demographic differentials in India was conducted by Dyson and Moore (1983). On the basis of examination of the differences in kinship patterns, especially those that relate to property inheritance and marriage, the authors concluded that the South-Indian culture, which accorded a relatively higher degree of autonomy

to females vis-à-vis their counterparts in the north, could be largely responsible for the comparatively lower fertility evinced by the states belonging to the former region.

Specifically, in the patriarchal societies that characterize most of North India, family descent is traced through the males of the family, and so is property inheritance. This reduces the economic as well as social value of daughters to their natal families, who are seen more as a social and financial liability. A conglomeration of fertility-enhancing factors are at work here, viz., the low average age of marriage of females, strong pronatalist pressures within the family (especially to produce a large number of sons) and the practice of exogamous marriages. Such marriage patterns ensure the subordinate position of women (especially the young brides), due to the loss of social contact of the bride with her natal relatives thus making her economically and socially dependent on the husband and his family. These features, though not altogether absent, are less pronounced in south India, which is characterized by endogamous marriage patterns and generally speaking, more egalitarian gender relations. With a relatively greater degree of autonomy within the family, women are far more empowered to take decisions regarding their personal welfare and those of their dependents, and this extends to reproductive decisions, including the adoption of family planning measures.

The study by Malhotra, Vanneman and Kishor (1995), which used maximum likelihood estimation method to model the determinants of fertility in India, found partial verification for the findings of Dyson and Moore (1983). Based primarily on district level data from the 1981 census, the authors found that among all factors, measures of patriarchy (as measured for instance by sex ratio of mortality, female share of total literates, proportion of women 15-19 unmarried, female share of labor force) and development, especially social development (male literacy rate, male child

mortality, population/physician ratio) went a long way in explaining the regional variations in fertility in India.

The importance of social development, particularly the overwhelming role of female literacy (an indicator of women's autonomy/status) in effecting lower fertility was also brought out by a careful study by Dreze and Murti (2001). Using district level panel data from the 1981 and 1991 censuses, the authors find that "even after controlling for district effects, women's education and child mortality emerge as the most important factors explaining fertility differences across the country and overtime.... By contrast, general indicators of modernization and development such as urbanization, poverty reduction, and male literacy rate bear no significant relation with fertility decline" (Dreze and Murti, 2001: 35). Interestingly, this study also found a significant negative effect of 'south' regional dummy, even after controlling for all other socio-economic and cultural variables. Other studies utilizing district level data (for example Bhat 1996; Guilmoto, 2000) have reached similar conclusions regarding the primary determinants of fertility differentials in India.

In contrast to the predominantly socio-cultural explanations, spatial/geographic diffusion theories have recently been put forth to explain the fertility transition in India (Guilmoto 2000; Guilmoto and Rajan, 2001). Based on cartographic analysis of the pattern of fertility decline among the regions of India for the period 1951 to 1991, Guilmoto and Rajan (2001) concluded that spatial variations in fertility are not random, and suggest that diffusion processes at the micro level could be largely responsible for fertility decline in India. However, further research is perhaps required to explain the exact mechanisms through which geographical diffusion may be taking place in the Indian context.

Research among the individual states of India, while broadly supporting the ‘social development’ view, offer a greater diversity of explanations for fertility decline. Kerala, with fertility and mortality levels matching those of developed countries today, was the first state in India to reach replacement level fertility (2.1 children per woman) by the end of the 1980s. Kerala began its fertility decline during the early 1960s, under conditions of low per capita income, high incidence of poverty, and low economic development, but a higher level of human development (literacy and health) vis-à-vis all-India as well as its more prosperous states (Bhat and Rajan, 1990; Krishanan, 1976; Zachariah, 1984). Remarkably, the fertility decline in the state took place at a time when the family planning programme was yet to gain momentum and arguably, some kind of societal adjustment had perhaps transpired that had fundamentally altered the social norms favoring a small family size. Indeed, a few studies indicate that social justice brought about by equitable distribution of land through land reforms, and increased wages of the poorer sections (especially the agricultural labourers) might have had an important role to play in lowering the demand for children and reducing fertility through providing a measure of economic and social security (see for example Ratcliffe, 1978). On the other hand, some researchers have also argued that the fertility reduction in Kerala might indeed have been ‘poverty induced’ (Basu, 1986; Mencher, 1980). However, high female literacy and improvement in child survival has been put forth as the leading explanation behind the spectacular fertility decline of Kerala.

Fertility decline in the neighbouring state of TamilNadu, (one of the largest states in India with respect to population size), took place under conditions of far lower levels of literacy and higher levels of mortality (especially infant mortality), as compared to Kerala. In contrast to the emphasis on social development in the context



of Kerala, the efficiency of the family planning programme has been put forth as one of the primary reasons behind Tamil Nadu's success in fertility decline (Anthony, 1992; Srinivasan, 1995). However, as rightly pointed out by several scholars, family planning methods could gain popularity among the masses because the gap between rising aspirations and limited resources to meet them, arising from agrarian modernization, strong rural-urban linkages, spread of mass media and social reform movements in the state, had already created the requisite demand for limiting family size in the first place (Bhat, 1998; Kulkarni et al., 2002; Nagaraj, 1997).

The other southern state to have achieved remarkable reduction in fertility since the middle of the 1980s is Andhra Pradesh, which again as in the case of Tamil Nadu, was successful in reducing fertility in the absence of substantial improvement in socio-economic development indicators like female literacy or infant and child health. It is now widely accepted that reduction in poverty rates primarily through the efficient implementation of the government's poverty alleviation programmes, along with other factors such as diffusion and acceptance of the idea of a small family, had a large part to play in the fertility decline in this state (Dev, James and Sen, 2002; James, 1999).

Punjab, an exception among the states in North India in having demonstrated fairly early declines in fertility (and in fact, at least as early as that in Kerala), did so in an environment characterized by relatively poor social indicators but rapid and *sustained* economic growth and security of livelihood (Das Gupta, 1999). Similarly, West Bengal evinced a relatively faster pace of fertility decline vis-à-vis its neighbours in eastern India, and reached near replacement fertility levels by the end of the 1990s.

Though the issue of fertility decline in West Bengal has received far less attention as compared to the other states discussed above, its achievement in fertility

decline has in fact, been quite remarkable, especially given its relatively modest achievement in both economic growth and social development, at least since the beginning of the 1970s (Maharatna, 2007). It is generally believed that historical factors had a major role in shaping the fertility transition in West Bengal. Specifically, Basu and Amin (2000) suggest that the ‘elite’ in this state were among the earliest to accept modern contraception as a means of limiting family size, suggesting openness to innovations, brought about by the peculiar set of historical conditions in the state that entailed an early exposure to the larger world. The authors argue that the diffusion of the idea of a small family as the ideal family might have taken place from the elites to the masses. However, as Maharatna (2007) observes, there is little evidence to suggest that top to bottom diffusion might have actually transpired in West Bengal. In fact, according to the author, fertility decline in the rural areas of the state *was* associated with diffusion, but of a separate kind. The diffusion of the small family norm was a by-product of the Left Front’s government’s grassroots mobilization network, which “.. contributed to a distinct rise in the social standing, dignity, self confidence of hitherto low-ranking groups ... All this is very likely to have augmented their aspirations, alertness and awareness pertaining to key aspects of well-being (including family size/fertility)” (Maharatna, 2007: 1402). Of course, the political stability in the state ensured the continuation of its various policies, leading to the successful transformation of the society in West Bengal.

The experience of fertility decline among the Indian states, points towards the crucial role of declining *desired* family size in reducing fertility, brought about, of course, by diverse set of conditions in the various regions and states. In this connection, Kulkarni (2011) notes that, “A common thread seen in the findings of

various studies is that the aspirations of all sections of the population about their children have risen over time...In a way, there is diffusion of the aspirations for such life (i.e. better life) for children. But the pace of this diffusion has varied across regions.” (Kulkarni, 2011: 18). While it is difficult to miss the underlying change in preferences towards a smaller family size brought about by rising aspirations for children, it is perhaps equally hard to deny the role of the Government (or governance, defined in a broad way) in providing the requisite conditions for the germination of fertility decline.

While it is almost certain, at least in the context of India, that the State sponsored family planning programmes had at best played the role of facilitating the decline (as against setting it on), it appears that there is another sphere where the role of the State has been crucial- its role in providing the necessary conditions, whether through economic development or through social development, which enabled people to plan under conditions of relative certainty about the future. Thus, Das Gupta (1999) reflecting on the similarities in the experience of Punjab (where fertility decline has been closely associated with economic development), and Kerala (where fertility decline was induced by significant human development), notes that, “[T]he most rapid fertility decline has been in those parts of the country characterized by more egalitarian economic and political institutions, and better governance as reflected in development outcomes and a stable legal order” (Das Gupta, 1999: 7).

Overall, despite differences in methodology, coverage (in terms of both area and time period) and variables considered, research points towards the importance of socio-economic and cultural factors in shaping fertility transition in the subcontinent. Particularly striking is the unanimity among the various studies on the role of women’s

autonomy/status (female literacy, female work force participation, son preference) and health infrastructure (as reflected in survival of infants and children) in reducing fertility rates. Along with it, and perhaps more importantly, review of the existing studies underlines the crucial function of the State in providing the requisite security of life and livelihood/resources. In fact, as we shall see in the following sections all these factors, and specifically, the issue of political governance among the states of NER could be particularly relevant, among other concerns, in the context of fertility decline (or its lack thereof) in NER, as discussed in the following section.

### **5.3 FERTILITY DECLINE IN NORTH-EAST INDIA: ISSUES AND HYPOTHESES**

#### ***5.3.1 Socio-cultural Influences and Fertility***

As noted in the foregoing discussion, Dyson and Moore (1983) observed the existence of a broad north-south cultural dichotomy in the subcontinent, with the North sunk in a deeply patriarchal mindset (thus according a low social status to women), and the South exhibiting more favourable gender relations (and a relatively higher status of women). The authors noted that women's status was a critical factor in influencing the outcome in many matters including fertility. Subsequent studies have repeatedly stressed the pivotal role of women's status/autonomy in shaping fertility and mortality differentials between these two regions, and the relatively lower status of women in North India has been held as one of the important determinants of the relatively higher fertility rates in that region (e.g. Basu 1992; Mari Bhat, 1998; Sopher, 1980 among others).

Female education, female work force participation (FWP), son preference and age at marriage, have been considered as imperfect, but acceptable indicators of women's status, in the majority of studies that have investigated the relationship between women's status and fertility (Dreze and Murti, 2001; Satia and Jejeebhoy, 1991; Malhotra, Vanneman and Kishor, 1995; among others). Interestingly, several researchers (for instance, Balk, 1994) have argued that in many cases, it is perhaps better to conceptualize status in *relative* terms, i.e. status of women as compared to other women or men, rather than in the absolute sense. Hence, we could talk about, for instance, gender difference in educational attainment, or the gap measured in terms of years of education between women and men as compared to the absolute educational levels or literacy of women, and so on for other indicators. In addition to these relatively regular measures of women's status, the availability of information on women's decision making in households made available recently has been utilized as an additional indicator of women's status in several household level studies in the Indian context.<sup>50</sup>

The role of female education in bringing about a decline in fertility has been recognized in every major theory of fertility transition, albeit the explanation behind *how* it does so, has differed somewhat. For instance, the economic/demand theories of fertility propose that the quantity-quality trade-off for children, increases in intensity

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<sup>50</sup> Notwithstanding the important role played by FWP in reducing fertility, we do not discuss its role in reducing fertility at length in this section for the simple reason that, until now, it is not entirely clear that there may not be bidirectional causality between fertility and FWP, thus precluding us from including it in any kind of statistical analysis of fertility in NER. In fact, it is for the same reasons that we do not incorporate infant mortality or age at marriage as fertility determinants. However, the discussion on the effect of the latter two variables on TFR has already been done in the previous section, and should not be a concern in the sense of not being examined in the present research at all.

with the education of the mother, leading to greater substitution of quantity for quality, thus tending to depress fertility. Further, education by way of raising the wages of women tends to raise the opportunity cost of women's time spent in household activities like child-care and hence tends to reduce fertility (Becker 1960, 1981; Leibenstein, 1957).

On the other hand, the ideational theory of fertility change (Cleland and Wilson, 1987) argues that the inverse fertility-education relationship can be caused by 'cognitive changes' rather than 'micro-economic realities'. This is borne out by the observation from a multi-national WFS study that in most of the countries, a few years of women's schooling has been sufficient towards a shift in their preferences towards a smaller family size and it has not necessarily been associated with increased employment opportunities. Thus, according to this theory, it is not absolutely necessary that only higher levels of education would be associated with declining fertility. Indeed, literate women could evince significantly lower fertility as compared to their illiterate counterparts. Indeed, a study conducted by the United Nations (1993) in rural Maharashtra found that the perceived as well as actual cost of children increases with the level of education of the mother. Even women with *primary* education reported significantly higher perceived and actual cost of children compared to those with no education. This could be so because in developing countries such as India (and especially in rural areas), foregone employment opportunities might not be a crucial factor for women, but schooling may change women's *perceptions* about the amount of maternal time and attention needed by children, thereby making children more time-intensive (see for instance Levine et al., 1991; Oppong, 1983).

Leaving aside the differences among the various perspectives, overall evidence from research has found female education (and literacy) to be a crucial determinant of fertility decline. In this connection, it would be useful to quote from Cleland and Jejeebhoy (1996), who have succinctly summarized the various routes through which female education might influence fertility:

“Schooling sets off changes in several dimensions of women’s situation which then account for changes in pathways affecting fertility. Notable among these is the evidence that schooling enhances women’s knowledge of the world around them, including knowledge of contraceptives, where to obtain them and how to use them accurately; that schooling enhances women’s say in family decisions including decision on contraception, marriage and health seeking; that it increases women’s interaction with the outside world, although it’s link to seclusion is context-specific; that it enables more intimate relations between women and husbands; and that it enhances women’s economic and social autonomy and self-reliance, including a shift away from a reliance on children for old age security or for legitimizing the woman’s position in her husband’s home (Cleland and Jejeebhoy, 1996: 87)”

In the present study, we incorporate female literacy and gender gap in literacy as proxies for the education dimension of women’s status. However, it must be mentioned here that in doing so, we lose the opportunity of differentiating between the various direct and indirect ways in which female education might be influencing fertility. For instance, as pointed out by Dreze and Murthi (2001), the female literacy variable would capture the total effects of an increase in female education on fertility, and thus, in our study, we cannot distinguish the relative impact of say, reduction in fertility

arising from increase in age at marriage, from that arising from an increase in knowledge about and use of contraception.

However, while most of the studies on the impact of female education and fertility have found an inverse relationship between them, it is quite possible that female education, at least that below secondary level (or less than five years) of schooling, can lead to an increase in fertility, primarily by reducing the duration of post partum nonsusceptibility to conception (through early weaning of infants) (Jain and Nag, 1986). This said, as noted by the author, any increase in fertility is likely to be short-lived because there is no reason to believe that eventually the increase in age at marriage and contraceptive use associated with increased female education, would not offset the effect of reduced lactation. This argument largely holds when we consider the effect of female education on fertility at the aggregate population level, as is the case in our study. As the average level of female education increases in a society and/or a larger number of women attain literacy, the fertility-inhibiting effects of female education become relatively more pronounced compared to the fertility-enhancing ones.

Gender bias or son preference, has shown itself to be a particularly stable feature of the socio-cultural fabric of India. One of the chief indicators of son preference, especially in the context of South Asian countries (and of course, India), is the active discrimination against females in access to basic necessities like nutrition and health care, the total effect of which is reflected (at least partially) in the relative survival of females as compared to males, or the sex ratio of the population (Dreze and Murthi, 2001; Kishor, 1993). Son preference has been identified as a major obstacle in reducing fertility in several instances in India, and it can keep fertility rates



significantly higher as compared to situations where parents did not have a specific preference for children of a particular gender (usually male) (Arnold, Choe, and Roy, 1998; Mutharayappa et al. 1997). To illustrate:

“if the probability of a newborn child reaching adulthood is, say, 0.75 (a plausible value for states such as Uttar Pradesh), a mother who, in effect, wants the risk of ending up without an adult son to be lower than 0.05 has to give birth to three sons; this would require six births on average. By contrast, if sons and daughters are considered equally valuable (so that the predicament to avoid is that of ending up with no adult offspring regardless of sex), three births are enough. If the probability of survival to adulthood rises from 0.75 to 0.8, two births are enough” (Dreze and Murthi, 2001: 38).

Indeed, in the context of India, we find that regions such as North India, which are characterized by a strong patriarchal mindset, exhibit both lower sex ratios and higher fertility rates, as compared to, for instance, the Southern region, where the states exhibit relatively better sex ratio and lower fertility rates.

However, since the sex ratio is susceptible to influence from demographic factors, such as migration (where the general pattern is a relatively higher male as compared to female immigration in the receiving population), we employ the child sex ratio (ratio of girls below six years to that of boys of the same age group) as the indicator of son preference. Indeed, as noted in the first chapter, gender bias against female children is on the rise in NER, and it would be interesting to see if this hitherto unknown factor has been playing a part in keeping fertility rates high in the region.

A variant of the socio-cultural explanation, which tries to explain the historical and contemporary divergence between tribal and non-tribal fertility, relates such fertility differentials to differences in the culturally accorded status to women in these two basically diverse societies, at least as far as their social and economic organization is concerned (for instance Maharatna, 1998, 2005). In fact, the role of culture in fertility change is particularly located in this feature of transferring *values* and information within a culturally identifiable group” (Lesthaeghe, 1977). The relatively higher status accorded to women in such societies, finds reflection in various ways, including delayed female marriage, greater acceptance of female celibacy, greater female autonomy, and use of indigenous means of birth control and abortion, all of which could work towards reducing fertility among the tribes (Maharatna, 2005). Remarkably, there are striking similarities between the Dravidian (southern) population and India’s tribal population (including North-east India) in several cultural aspects, especially relating to and reflecting the higher status of women in both societies. In fact, “the south Indian mainstream people historically (and even now) evince several socio-cultural features (e.g. marriage patterns and payments including cross-cousin marriage and bride price) that have traditionally characterized tribal societies in much of India too” (Maharatna, 2005: 27). The bottom line is that, a priori, there is reason to expect lower fertility among populations that are dominated by tribes within NER.

Having said that, contemporary evidence on tribal versus non-tribal fertility differentials in India suggest a reversal of the earlier pattern of fertility differentials between the former and the latter, and relatively higher fertility among the tribes as compared to non-tribes (IIPS, 2007). This has been largely attributed to the

phenomenon of ‘*Sankritization*’ of the tribal communities, whereby they emulate the socio-cultural practices of their socio-economically advanced non-tribal counterparts, leading to outcomes like early marriage of females and dowry payments and overall, an increase in preference for sons. Indeed, such tendencies towards increasing son preference could result in higher fertility *especially* among tribes, whose societies still remain lagging in nearly every sphere of socio-economic development.

In the context of the North-east specifically, there is an additional reason why tribal communities might elicit higher fertility levels. As mentioned in the first chapter, one of the crucial demographic developments in the region has been the large volume of immigration in nearly all the states of NER. This has resulted in demographic imbalance in the region, with the possibility that with continuing immigration of non-tribals into the region, the tribals would be reduced to a minority. The fear of being ‘outnumbered’ as also an associated anxiety about a ‘loss of identity’ eventually, may spur the tribal communities towards a larger family size as a possible solution to the problem. Indeed, this phenomenon has been examined in detail in the case of the Khasis of Meghalaya by Saikia (2005), and results largely show that the fear of identity loss has been a major factor behind the relatively higher fertility rates among the Khasis. Overall, given the contradictory influences of tribal socio-cultural practices on fertility in contemporary times, the impact of this factor on fertility in NER remains a matter of empirical verification.

Particularly interesting in the context of North-east India has been the concern over the fertility-enhancing impact of religious conversion to Christianity. It is oft-claimed that the Church, with its distinctive anti-contraception stance, has been responsible for the relatively higher fertility in NER (for instance, Saikia, 2005). In

fact, we propose that adherence to Christianity may well-nigh have a fertility inhibiting effect, in view of the fact that these populations would be exposed to influences from a larger (or even global) community, and hence have an earlier exposure to the idea of a small family as a better choice. A second and more important reason for expecting lower fertility among the Christians is their higher age at marriage as compared to populations of other religious groups in NER (see for instance Kar, 2002).

In this context, it would be also interesting to study the interplay between adherence to Christianity and belonging to the category of Scheduled Tribes. In fact, this particular constellation could indeed elicit higher fertility, primarily because religious doctrines (including those regarding the morality of using family planning methods) would have a greater hold over decisions regarding fertility among the tribes due to the particular set of circumstances that surround these communities today, including socio-economic underdevelopment and the fear of identity loss, as mentioned in the previous paragraph. In fact, several scholars (for instance, Hirsch, 2008) have noted that the relationship between the ideological doctrines of Christianity and contraceptive use/fertility is context-specific, and even when women (and men) continue to remain 'religious', they may adopt modern contraception in situations where there have been substantial improvements in their overall social and economic condition.

Hence, there is no gainsaying that the fear of identity loss and the felt need for cultural revival among these communities, could lead its members to a stricter adherence to their established customs and traditions- of which the Church and its preaching, would no doubt, be an integral part. In such a scenario it is difficult to envisage significant decline in fertility in the concerned population.

With this, we now turn towards the role of socio-political factors, and the State in determining fertility differentials in NER.

### ***5.3.2 Socio-political Influences and Fertility***

The political dimension of fertility has been an under-researched area, especially in the Indian context. Nevertheless, the discussion of its possible role in affecting social outcomes like fertility, assumes special importance in the case of NER, where the society is still undergoing a process of political transition, as revealed by the protracted socio-political unrest in the region throughout the post-Independence period.

Indeed, apart from the power struggles among the ethnically dominant groups in the new-formed/tribal dominated states of NER, the ethnic minorities *within* these states claim that their rights and resources are being impinged upon by the ethnic majorities, and thus they have been demanding for political autonomy or even secession from the existing states, paving the way for further divisions of the existing territories of the states of the region (Baruah, 1989; Barbora, 2002; Roy, 2002; Shimray, 2004).<sup>51</sup> In fact, if the frequency of election, as a proxy for political stability, in the various states of NER is anything to go by, data show that on average, while Assam, Manipur and Tripura have witnessed elections every four and a half years, the other states (tribal majority states) have experienced it more frequently, at around every four years on the average (for details on each state see Appendix 5).

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<sup>51</sup> All this, it must be remembered has its roots in the socio-economic and administrative policies adopted towards the region during the colonial period, and continued to some extent life in the Independent era as well, that resulted in a distinctly backward socio-economic structure in NER, with ramifications for economic and human development, as discussed in the first chapter.

The idea that fertility might have socio-political roots has already been noted in the literature on the subject elsewhere, and its role in maintaining high fertility rates has been emphasized particularly in the context of sub-Saharan African countries (Janus, 2013; Kokole, 1994).<sup>52</sup> The importance of this factor in determining fertility outcomes primarily arises from the fact that in societies (such as NER) which are still undergoing the process of political transition, population size has a direct relation to the distribution of economic (and social) resources among the various ethnic communities engaged in the struggle. In this connection, Janus (2013) identifies at least two ways in which fertility might be related to redistribution of resources among the various ethno-cultural groups, “First, individuals in diverse societies tend to vote for co-ethnic political candidates, who then reward them with transfers, jobs, or local public goods. Fertility should therefore increase an ethnic group’s voting power and gains from political office. Second, if ethnic groups allocate society’s resources via conflict or bargaining in the shadow of conflict, then fertility might increase their combat strength” (Janus, 2013: 2).

In this connection, it is important to note that sharp differences exist between the newly created states of NER (Nagaland, Meghalaya, Mizoram) and others especially, Assam, Manipur and Tripura, in that the process of cultural assimilation of ethnic minorities in the latter three states has been already accomplished to a large extent. “In these three states, the minor ethnic groups (tribals) are forced to learn the dominant

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<sup>52</sup> In fact, the similarities in the fertility trajectories of sub-Saharan African and NER are quite remarkable. As noted in the previous chapter, both regions have been experiencing extremely slow fertility decline or even stalled fertility, at least since the beginning of the 1990s, and what is more both societies have been undergoing socio-political turmoil capable of influencing social outcomes such as fertility.

language in order to embed the dominant's interest. For instance, the tribals of Manipur are compelled to learn and speak Meitei's language Manipuri, the Bengali language is introduced among tribals in Tripura and Assamese in Assam" (Shimray, 2004: 4642). Thus, efforts at securing a larger share of resources through the twin strategies of engaging in conflicts with the State, and increase in population size, can be expected to be relatively weaker among the latter, as compared to the newly formed states, where political supremacy of any particular group can be, and is still being questioned by the others.

Therefore, in the context of NER, we hypothesize that the presence of relatively few but ethnically large groups within a defined region would lead to a stronger tendency towards using the aforesaid methods as instruments for obtaining socio-economic and political power. In other words, we expect that larger the number of numerically *smaller* groups in a state or the greater its ethnic diversity, *lower* would be the fertility rate, *ceteris paribus*.

Finally, institutions could also affect the returns to fertility, and in fact, the aforesaid outcomes of ethnic diversity are more likely in situations where the State has failed in delivering the goods, crucial among which is safety of life and property. Put differently, conflict as a means of attaining a larger share of resources, can be expected to pay off only in situations where the State is administratively weak, or shows signs of institutional weakness. Therefore, we also try to account for the effect of institutional weakness on fertility in its own right, and as it interacts with ethnic diversity.

It should also be mentioned here that even though there are reasons to expect that weaker State institutions would encourage higher fertility, we believe, the opposite possibility cannot be ruled out. In fact, in the case of NER, where socio-political

turmoil and loss of lives arising from ethnic clashes has become the order of the day, weaker institutions could also reduce the number of children, for instance in cases where there has been an increase in widowhood for the reason of conflict (for instance, Schindler and Brück, 2011).

## **5.4 MATERIAL AND METHOD OF STATISTICAL ANALYSIS**

### ***5.4.1 Variables and Data sources***

In this study, we have carried out a district level cross-sectional and panel data analyses of the determinants of fertility in NER, for the year 1991 and 2001. We should mention at the outset however, that there have been some debates regarding the usefulness of fertility analysis at aggregate level as carried out here. Critics have mostly argued that since fertility is an individual choice, its determinants must be found at the individual level. However, borrowing the argument from Dréze and Murthi (2001) regarding the usefulness of such analyses at the district level, we propose that fertility is as much a social outcome or a collective choice, as it is an individual choice, and social influences on fertility are difficult to capture at the individual or household level. To that extent then, the results of the analyses using the latter type of data could be biased. However, if TFR were mainly affected by household and individual characteristics alone, the results of the present study would be affected by aggregation bias, i.e. of treating the district as an aggregate of its smaller units (households/individuals). Be that as it may, it seems best to think of these two



types of analysis as complementary rather than competing in nature, and that taken together they provide a more holistic understanding of the issue.<sup>53</sup>

Table 5.1 contains information on the mean and standard deviation of all the variables included in the study. As mentioned earlier, the response variable is the district level TFR. Estimates of fertility at the district level are not available from standard large scale surveys like the Census or the SRS, or the NFHS. However, as indicated in chapter 3, it is possible to derive indirect estimates of fertility from census data on children ever born classified by the age group of the mother. We have arrived at indirect estimates of TFR for the districts of NER, using the aforesaid information from the Census and have used the Arriaga-Arretx method for estimation (please see chapter 3 for details of the method). We should also mention here that district level fertility estimates for India for the years 1991 and 2001, have been arrived at earlier by Mari Bhat (1996) and Guilmoto and Rajan (2001) respectively, using the reverse survival method. However, there were differences in the details of the estimation procedure between 1991 and 2001, so that the estimates were not strictly comparable between the said periods. Given our primary need for *comparable* estimates for 1991 and 2001, we opt for arriving at our own fertility estimates. It should perhaps also be mentioned here that despite differences in the method of estimation, our estimates correspond reasonably well with that arrived at by the authors. In fact, the coefficient

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<sup>53</sup> It should perhaps be mentioned here that a resolution of this issue has in several cases taken the form of using a different statistical approach for modelling the determinants of fertility change, viz., multilevel modelling. Indeed, even though there remains an element of subjectivity in choosing the independent variables at different levels of aggregation- generally, individual, household, and community levels- there is a possibility of lesser confusion among the various effects as they impact fertility, and more importantly, the effects can be parceled out over the different aggregation levels. Unfortunately, multilevel modelling is ruled out in the case of NER due to the lack of data at the required levels of aggregation.

of correlation between our estimates and the reverse survival estimates for each period is around 0.6, which can be considered reasonably good, given the differences in the estimation procedures. Also, it should be mentioned here that there was a change in the number of districts between 1991 and 2001, with the number of districts increasing from 63 to 77 during this period. We have made the necessary adjustments in all the variables (as required for the panel data analysis) by merging data on the newly formed districts to create variables for the original districts that existed during 1991. This has sometimes resulted in the loss of some data points, and hence reduction in the sample size.

Most of the information on the independent variables shown in Table 5.1, except for the crime rate, has been gleaned from the Census of India. Data on the crime rate has been derived from the publication ‘Crime in India’, for the respective years. Our indicators of/proxies for female status are female literacy rate and gender gap in literacy. Female literacy rate measures the percentage of literates in the female population aged 7 and above, and gender gap is defined as the difference in the literacy of males and females (male literacy rate minus female literacy rate). Child sex ratio has been used here as the indicator of son preference. The social composition of the districts is captured by the proportion of Scheduled tribes and Christians in total population. Crime rate is used in the analysis as an indicator of institutional weakness. However, we must admit here that crime is just one of the indicators of State’s inefficiency (or institutional weakness), and an index covering other aspects would have been ideal. Data limitations do not allow us to construct such an index for the districts/states of NER. Hence, we rely on the crime rate, however crude, as an indicator of institutional weakness.

**TABLE 5.1 DEFINITION AND SAMPLE MEANS OF VARIABLES: NER 1991, 2001**

Variable	Definition	Mean (Standard Deviation)		1991-2001 Standard Deviation	
		1991	2001		
Total fertility rate	The average number of children that would be born to a woman between ages 15 and 49.	4.3 (0.9)	4.0 (1.4)	Overall	1.2
				Between	1.2
				Within	0.3
Female literacy rate	Percentage of females above 7 years, who can read and write with understanding.	43.4 (12.7)	55.4 (12.7)	Overall	14.0
				Between	12.4
				Within	6.6
Child sex ratio	No. of females 0-6 years per 1000 males of the same age group.	978.9 (18.2)	965.6 (18.5)	Overall	19.5
				Between	14.0
				Within	13.9
Gender gap in literacy	Difference between male and female literacy rates (Male literacy rate minus Female literacy rate).	17.9 (5.6)	15.8 (5.8)	Overall	5.8
				Between	5.5
				Within	1.7
Urbanization	Percentage of population residing in urban areas.	13.2 (11.6)	15.7 (12.5)	Overall	12.1
				Between	11.6
				Within	3.5
Christian	Percentage of population adhering to Christianity.	29.9 (38.2)	27.0 (36.6)	Overall	37.4
				Between	37.7
				Within	4.5
Scheduled Tribes	Percentage of scheduled tribe to total population of district.	48.8 (36.5)	48.9 (37.1)	Overall	36.7
				Between	36.8
				Within	1.2
Crime	Number of IPC crimes per lakh population in a district.	1500.4 (684.5)	1221.5 (738.8)	Overall	723.0
				Between	628.1
				Within	362.5
Ethnic diversity	Measured as the score on the Herfindahl-Hirshman index for 2001, reflecting concentration of ethnic groups in each state.	0.8 (0.13)		Overall	0.16
				Between	0.16
				Within	0

The variable measuring ethnic diversity has been created using information on the number and population size of the ST groups in the states of NER, as provided in the 2001 census. Diversity has been defined as the Herfindahl-Hirshman index,

$$D_j = 1 - \sum_{i=1}^{N_j} s_{ij}^2 ;$$

Where,  $N_j$  is the number of Scheduled Tribe groups in a state and  $s_{ij}$  is the population share of a particular tribal group in total population of the state. Thus, with a few numerically large ethnic groups,  $D_j \rightarrow 0$ , and with numerous smaller groups,  $D_j \rightarrow 1$ . In the case of NER, we find that the value of the ethnic diversity index, as expected, is closer to zero for the states of Meghalaya, Nagaland and Mizoram and closer to 1 for Assam, Manipur and Tripura (see Appendix 6 for the values of the index for all the states of the region). Including state level controls for ethnic diversity may be important since a few regions/states of NER (viz., Meghalaya, Nagaland and Mizoram) have historically evinced both high ethnic diversity as well as fertility. We therefore impose the state level index on all the districts belonging to that state in our analyses. Further, we employ the ethnic diversity index of 2001, for the 1991 cross-sectional regression analysis as well.<sup>54</sup> We should also mention here that we have not included the female work participation rate and infant mortality rate as explanatory variables in the analyses, as there is a strong possibility of bidirectional causality

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<sup>54</sup> This has been done keeping in view that there has been very slight changes in this variable between 1991 and 2001, which means that variation in these values over the aforesaid period is unlikely to be an useful determinant of fertility changes. Further, we also experimented with a variant of this index, by creating a dummy that assumes a value of 0 for states where ethnic diversity as measured by the Herfindahl-Hirshman index is below 0.5, and assumes the value of 1 otherwise. The inclusion of the dummy instead of the index does not change the results of the analyses.

between TFR and the aforesaid variables, leading to possibly biased estimates from the regressions.

Table 5.1 reveals that there is considerable cross-sectional variability in the data set. During the period of the study, the TFR declined marginally from 4.3 children per woman in 1991 to 4 children per woman in 2001 in NER. The female literacy rates increased considerably during the same period. The decline in the gender gap in literacy suggests that even though there was also an increase in male literacy during this period, female literacy rate increased at a relatively faster *rate* between 1991 and 2001. There has been a rather striking decline in the child sex ratio, suggesting possible intensification of son preference during this period. The growth of urbanization in the region was rather slow during the period 1991 to 2001, and even in 2001, nearly 85 percent of the total population continued to reside in rural areas. There has been practically no change in the proportion of tribes in the total population, and nearly 51 percent of the population belonged to one or other of the tribal groups in 2001. Interestingly, we find a small but significant decline in the percentage of Christians in NER, suggesting the possibility of relatively slower population growth in this community. Finally, we find an overall reduction in the crime rate in NER, and an examination of the data shows that the reduction has been spread over nearly all the districts of the region.

A particularly interesting possibility with panel data is that of differentiating between the cross-sectional (between units) and time (within individual units) dimensions of the data. As can be seen from Table 5.1, TFR varied relatively more between the districts as compared to variation overtime, as expected (given the short nature of the panel). Likewise, we find greater between-units variation as compared to

within variation in nearly all the independent variables. Remarkably however, we find almost comparable variation along these two dimensions in the case of the child sex ratio, suggesting substantial reduction in this variable in NER during the period 1991 to 2001, as mentioned earlier. Also significant has been the overtime variation in the female literacy rate, and to some extent that in crime rate (which we know has been in the direction of falling rates of crime in NER).

### ***5.4.2 Empirical Model***

The main method of statistical analysis involves the estimation of a panel data model for the period 1991 and 2001 that assumes the form:

$$\text{TFR}_{dt} = \alpha_d + \beta X_{dt} + \varepsilon_{dt}$$

Here,  $\text{TFR}_{dt}$  is the total fertility rate for district  $d$  at time  $t$ ,  $\alpha_d$  is the district-specific effect,  $\beta$  is a vector of the coefficients,  $X_{dt}$  is a vector of explanatory variables, and  $\varepsilon_{dt}$  is the error term. The explanatory variables include female literacy rate, gender gap in literacy, child sex ratio, urbanization, Christians, Scheduled Tribes, Crime and ethnic diversity, along with interactions terms of ST and Christian and crime and ethnic diversity.

There are two ways of estimating the district specific effects,  $\alpha_d$ . The first is the fixed effects approach, which amounts to estimating  $\alpha_d$  as a coefficient of the dummy for every district using Ordinary Least Squares Regression method. The dummy captures all time-invariant factors affecting the response variable, measured and unmeasured, within the district specific effect. The second is the random effects approach, which assumes that the district specific effect can be treated as an additional (and an addition to the) error term, and has no correlation with the explanatory

variables included in the model. The composite error term ( $\alpha_d + \varepsilon_{dt}$ ) allows estimation by the method of Generalized Least Squares. The foremost advantage of employing the fixed effects method is that it provides unbiased coefficient estimates by controlling for unobserved heterogeneity across units. However, there is a price to pay for it, and it lies in losing many degrees of freedom in the estimation of the unit specific dummies. Hence, the fixed effects method uses data rather less efficiently (Hsiao 1986). The alternative method, i.e. random effects, appears attractive in this regard. However, the estimates from the latter type of analysis could be misleading if there are reasons to suspect that the district specific effects may be in fact, correlated with the explanatory variables. A formal test for confirming the orthogonality between the former and the latter, and selecting between the two methods of estimating panel data models has been devised by Hausman (1978), and provided routinely by most statistical packages<sup>55</sup>.

## 5.5 MAIN FINDINGS

Table 5.2 presents the main results of the analyses. It should be mentioned at the outset that the selection of the independent variables has been constrained by the availability of data at district level. However, post-estimation checks suggest that the overall the models are reasonably good and specifically, do not show any strong omitted variable bias (that assumes special significance in the case of the cross-sectional OLS regressions for 1991 and 2001) (please see Appendix 7 for various post-estimation regression diagnostics). More importantly, a particular concern in statistical analysis of this kind is the possible contamination of the results introduced by the

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<sup>55</sup> All regression analyses have been carried out using STATA version 9.1.

presence of spatial dependence in the data (where the value of a variable observed in a particular region is influenced by its value in neighbouring areas).

Specifically, in our case it could happen that the value of TFR in a particular district is influenced by the independent variables associated with that district *as well as* that in neighbouring districts (known as spatial lag, and which can be assumed to reflect diffusion over space) and/or, there may be some spatially correlated factors/variables omitted from the analysis, which influence TFR across the various districts, leading to correlated error terms in OLS regression (known as spatial error). The overall implication is that in the presence of unaccounted spatial dependence, the coefficient estimates are likely to be biased and inconsistent or inefficient, and the solution is to take this factor directly into account.

In our case however, we did not find any significant presence of spatial dependence in the data (either spatial lag or spatial error). In fact, the coefficient of spatial dependence ( $\rho$ ) turned out to be insignificant in the regressions for both 1991 and 2001 (please see Appendix 8). Also, the goodness of fit (R-squared) remains practically unchanged after including the spatial dependence term in the regressions, which is another way of saying that spatial dependence does not have any significant effect on TFR in our case. Finally, basic standard diagnostics for spatial dependence, viz., Moran's I (spatial error), Lagrange Multiplier (spatial error), robust Lagrange Multiplier (spatial error), Lagrange Multiplier (spatial lag), robust Lagrange Multiplier (spatial lag), largely show the absence of any form of spatial dependence.



**TABLE 5.2 RESULTS FROM CROSS-SECTIONAL AND PANEL ANALYSES:  
NORTH-EAST INDIA, 1991-2001**

	1991: OLS	2001: OLS	PANEL 1991-2001	
	(1)	(2)	GLS-RE (3)	OLS-FE (4)
Constant	7.522 (1.59)	0.735 (0.08)	2.512 (0.57)	0.6608 (0.16)
Female literacy rate	-0.030*** (3.19)	-0.054*** (3.52)	-0.026*** (3.96)	-0.023** (2.18)
Gender gap in literacy	-0.023 (1.31)	-0.029 (0.69)	0.003 (0.16)	0.055** (1.89)
Child sex ratio	-0.001 (0.11)	0.009 (1.09)	0.004 (0.91)	0.005 (1.20)
Urbanization	-0.019** (2.57)	0.004 (0.30)	0.018 (1.48)	0.049 (0.88)
Scheduled Tribes	0.011*** (2.79)	0.024** (2.54)	0.015** (2.55)	-0.041 (1.05)
Christianity	0.028 (1.13)	-0.089* (1.72)	-0.057** (2.10)	-0.104* (1.76)
Crime	0.0002 (1.09)	-0.001 (1.56)	-0.0007*** (3.28)	-0.001*** (3.91)
Ethnic diversity	-1.520** (2.63)	-3.434*** (3.91)	-1.954*** (3.11)	-
Christianity and Scheduled Tribe interaction term	0.0002 (0.86)	0.001 (1.57)	0.0006** (2.01)	0.0013* (1.92)
Ethnic diversity and crime interaction term	-0.0002 (0.67)	0.001 (1.24)	0.0008*** (3.28)	0.001*** (3.16)
R <sup>2</sup>	0.68	0.68	0.56	0.52
F statistic (p value)	10.24 (0.0000)	23.42 (0.0000)	-	4.75 (0.0002)
Wald, $\chi^2$ (10) (p > $\chi^2$ )	-	-	97.96 (0.000)	-
Sample Size	61	52	113	113
GLS vs. FE $\chi^2$ (9) (p > $\chi^2$ )	-	-	47.12 (0.000)	

Notes: (a) OLS = ordinary least squares, GLS = generalized least squares, FE = fixed effects, RE = random effects

(b) \* significant at 10 percent level, \*\* significant at 5 percent level\*\*\* significant at 1 percent level

(c) Absolute t-ratios in parentheses

(d) All standard errors are heteroscedasticity robust

(e) The F test and the Wald test are tests of the hypothesis that all coefficients (except for the error) are equal to zero

(f) The GLS vs. FE  $\chi^2$  is the Hausman test for selecting between the random and fixed effects

(Appendix8).<sup>56</sup> Thus, having satisfied ourselves that there are no major problems in the modelling of TFR in the analyses, we proceed to discuss the results of our analyses.

The first column contains the OLS regression results for 1991. Overall, the explanatory variables explain around 68 percent of the total variation in TFR. The female literacy rate shows up with a negative sign and is highly significant. Likewise, urbanization contributes to a decline in fertility. However, the Schedule Tribe variable is positive and significant, implying a possible erosion of the fertility-inhibiting socio-cultural practices among the tribes, and a strengthening of pro-fertility features such as earlier marriage of females and an overall increase in fertility preference.

In fact, this is an important finding, especially in view of the fact that earlier studies (for instance Dreze and Murthi, 2001) had found an inverse relationship between tribal status and fertility. Indeed, data shows that contraceptive prevalence rates are especially low among the ST and significantly lower as compared to non-tribes in NER (Appendix 9). However, the lower use of contraception could be a result of poor performance of the family planning programme and/or a higher fertility preference among the tribes. Data shows that the second possibility cannot be ruled out in the case of the tribes of the North-east. Also, the percentage of men who want more sons as compared to daughters (an indicator of son preference) shows that tribes as compared to non-tribes have a stronger son preference in NER. However, it is particularly true of the states where tribes are a minority. Finally, information on infant

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<sup>56</sup> Since, we do not perform spatial regression in our analyses, we refrain from a full discussion of the issue and hence on the various diagnostics tests for spatial dependence. However, we could mention that while the simple Lagrange Multiplier (LM) measures the existence of spatial lag or spatial error, as the case may be, the robust LM for spatial error checks for the error dependence in the presence of missing *lagged* dependent variable, while robust LM lag is the other way round.

and child mortality reveals huge differentials between the tribes and others, with the former evincing substantially higher infant and child mortality rates as compared to the latter (Appendix 9). This could be a crucial reason behind the relatively higher fertility preferences and resulting higher fertility among the ST in the region, especially after controlling for ethnic diversity in the present analysis.

Not unexpectedly perhaps, greater ethnic diversity leads to lower fertility. This suggests among other things, larger the number of ethnically smaller groups, lesser is the probability of engaging in (armed) conflicts with the State and hence using population strength as a combat strategy as explained earlier. Gender gap in literacy and child sex ratio do not show any significant impact on fertility. The indicator of institutional weakness, i.e. the crime rate also turns out to be insignificant in the 1991 regression. Evidence also does not suggest the possibility of a fertility-enhancing outcome for the joint effect of Scheduled Tribe and Christianity.

The results of the 2001 regression are broadly similar to the 1991 OLS regression. Remarkably, female literacy and Scheduled Tribe turn out to be significant yet again and the same signs as earlier. Hence, there seems to be a strong relationship between these two factors and fertility among the districts of NER. Likewise, we again find that the index of ethnic diversity is significantly negative. However, urbanization is no longer significant during 2001. Christianity, that was not a significant determinant of fertility during 1991, turns out to be significant during 2001, and has an inverse relationship with fertility. This is in contrast to a few studies (e.g. Saikia, 2005) that showed Christianity to a possibly fertility-enhancing factor (among tribes) in NER. However, our results support the findings of a few recent studies on the inverse relationship between Christianity and fertility (e.g. Khongsdier, 2002), and largely

favour the hypothesis that the diffusion of the idea of a smaller family might have transpired earlier among the members of this community and/or that the higher age at marriage may have led to lower fertility rates among them. In fact, the apparent positive relationship between Christianity and fertility (as for instance reported in the NFHS data for the North-eastern states) is the result of the strong correlation between Christianity and ST. For instance, running the OLS on 1991 data without including the ST variable, results in a significant and *positive* coefficient of Christianity on fertility. However, putting back the ST variable reverses the sign on Christianity while still keeping it a significant determinant of fertility in the analysis (results not shown in table). The remaining variables are not significant in explaining fertility differentials within NER in 2001.

Columns 3 and 4 present the random effects and fixed effects results respectively. The Hausman test indicates significant correlation between individual (district) specific effects and the independent variables in the model, leading to possible bias and inconsistency in the random effects estimators in our case. Hence, in the next few paragraphs we concentrate on the results of the fixed effects estimation, which provides the variable estimates after controlling for district-specific effects.

Overall, the fixed effects results are broadly consistent with the individual cross-sectional regressions for 1991 and 2001 (Table 5.2). Remarkably, both the indicators of female status/autonomy are highly significant and show that while increase in female literacy leads to a decline in TFR, increase in the gender gap in literacy is related to a rise in fertility. These effects are found to be significant even after controlling for other socio-economic and cultural attributes, such as caste/class (ST), religion, and urbanization. Hence, an increase in women's status (at least to the extent

captured by these two dimensions), independently of other factors can be expected to lead to a decline in fertility in NER.

Numerous studies at both the international (see for instance Akin, 2005; Bulatao and Lee, 1983; Cleland and Wilson, 1987; Subbarao and Raney, 1995) and national level (see for instance Basu, 1992; Dreze and Murthi, 2001; Jain and Nag, 1986; Sharma and Retherford, 1990), find that increase in female education drives down fertility. Indeed as noted by Dreze and Murthi (2001), the significance of female education in reducing fertility in each of the model specifications, and especially in the panel data model, dispels any lingering doubts about a 'spurious' relationship between the former and the latter caused by an omitted third variable. Thus, sustained thrust on female education can be considered a crucial determinant of continued fertility decline in the future.

A rise in the proportion of Christians in the population is found to have a depressing effect on fertility, thus refuting the hypothesis that the Church has had a fertility-enhancing role in the region. Quite to the contrary, Christianity, after accounting for other factors (especially the percentage of ST in the population) is associated with lower fertility, possibly due to a wider world view (or a modern world view) leading to such cognitive changes that are associated with reduction in fertility or even higher age at marriage of the Christians as mentioned earlier. Also, the interaction term between Christianity and ST is significant and works in the direction of raising fertility. Thus, Christianity is associated with higher fertility to the extent that it is associated with ST status.

Interestingly, the coefficient of the crime variable is significant and negative, suggesting that in fact, an increase in institutional weakness (to the extent captured by

the crime rate) leads to a reduction in the fertility rate. In fact, as we noted earlier, crime can affect fertility in two ways- it can lead to a (short-term) rise in fertility when families want to replace lost children, or it can lead to a decline in fertility due to marriage-market effects (breakup of marriages and widowhood, displacement, separation of spouses, loss of financial capacity to support more children, maternal mortality) (Schindler and Brück, 2011). In this case, the replacement effect seems to be less important than the dissolution of marital bond (possibly due to death of the spouse) resulting in the decline in fertility. In this context, it is also interesting that the interaction term of institutional weakness (crime) and ethnic diversity has been found to have a significantly positive effect on fertility, suggesting that increased social insecurity among the numerically smaller groups (such as under conditions of conflict) has the potential to raise fertility rates among the concerned populations.

Remarkably the variables capturing son preference, the extent of urbanization, or the proportion of ST in the population, do not show any significant effect of fertility in NER. That urbanization and ST would not have any impact on fertility in the fixed effects regression, is however, not completely unexpected, as there has been very slight change in these variables between 1991 and 2001. However, we cannot rule out the possibility that the insignificance of the indicator of son preference could be an outcome of choice of the variable itself (i.e. child sex ratio as an indicator of son preference), and we could have obtained other results had we used other refined measures of son preference. Nevertheless, it is perhaps also possible that even though there are signs of increasing son preference in NER (as indicated in Chapter 1), it has yet not assumed such proportions as to influence reproductive decisions (specifically towards increasing the number of children) in the region and its states.

## 5.6 DISCUSSION

The examination of district level determinants of fertility in NER presents useful insights into the forces affecting reproductive decision making (at least as far as fertility is concerned) in the region and provides a deeper understanding into the regional fertility differentials in India.

Indeed, perhaps the most significant finding flowing from this analysis is the fundamental role of women's status and women's agency in bringing about fundamental changes in society. In fact, female literacy rate has been consistently found to have a significant fertility reducing effect in NER, in the present analysis as well as that in the earlier chapter. There is no denying the fact that in NER as in other regions of India, empowerment of women, for instance, through increase in their education, and though not investigated in the present chapter, through related factors such greater participation in economic, social and political spheres, as pointed out by several studies, holds the key to faster fertility declines in demographically lagging regions including NER.

This analysis also makes a case for a careful re-examination of the alleged links between religious affiliation and fertility/fertility decline in India. As shown here, although Christianity has been sometimes understood as having a negative impact on the adoption of contraception and hence on fertility reduction, the effect of this factor is in fact, highly context specific, and in NER at least, it has been found to have a positive effect on the fertility decline. Indeed, it can be reasonably expected that the effect of religion on fertility in various parts of India, may not have stemmed from the doctrines of the religion *per se*, but from the interconnectedness of this factor with

several other factors such as poverty, lack of socio-economic security and even the provision of health facilities in the particular religious communities, giving rise to the apparently straightforward relationship between religious affiliation and fertility.

A particularly interesting finding in the case of NER has been the relationship between ethnic diversity and fertility. The results of our analysis show that ethnopolitical conflicts do not necessarily have demographic consequences (even though they may have demographic roots, such as continuing non-tribal in-migration into NER), but only in situations where the benefits are tangible in terms of further access to political power and autonomy. In the context of NER, we find that the existence of numerically smaller but a larger number of ethnic communities actually leads to a lower fertility. This is so because, as argued earlier, these smaller communities have been already assimilated to a great extent in terms of language and culture into the larger ones, with the result that there are no considerable conflict of interests between the former and the latter, so that following set norms of the dominant groups on personal behaviour such as fertility, is not questioned.

In this context, it is rather remarkable that the study of the regional demography of NER highlights the importance of local or contextual factors in fertility transition. In fact, it is in this connection that Greenhalgh notes, “that the closer we get to understanding specific fertility declines, the further we move from a general theory of fertility transition” (Greenhalgh, 1990: 85). Indeed, earlier studies on fertility differentials within India, for instance, that in South India, note the presence of specific historical factors, which played a determining role in shaping the course of the fertility transition in the states of the region.



However, as this study shows there are some factors, such as women's autonomy/status that are universal in the sense that they have been found to influence fertility irrespective of the particular regional context or perhaps even time. Indeed, as various regions convergence on socio-economic and socio-political dimensions, local or context specific factors may be expected to assume a lesser role in determining fertility. However, till such time, studies on regional demography, as also on specific communities such as the tribes or the so-called lower castes will continue to remain important in their own right as and more importantly, to inform population and development policies.