

## APPROACHES EXPLAINING REGIONAL DIFFERENCES IN FERTILITY DECLINE IN INDIA<sup>\*)</sup>

With 4 figures and 7 tables

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*Zusammenfassung:* Ansätze zur Erklärung regionaler Unterschiede im Fruchtbarkeitsrückgang in Indien

Der Beitrag diskutiert zunächst mit der Anpassungs- und Innovations-Diffusionshypothese zwei oft konträr dargestellte Standpunkte vor dem Hintergrund empirischer Untersuchungen. Aus der jeweiligen Perspektive wird am Beispiel von Indien sowohl auf der Meso- als auch auf der Mikroebene die hohe Erklärungskraft der schulischen Bildung von Frauen für den Geburtenrückgang interpretiert.

Anpassungs- und Innovations-Diffusionshypothese schließen sich nicht aus, sondern ergänzen sich in ihrer Aussagen zu regionalen Abweichungen im Fruchtbarkeitsrückgang. Auf der Mesoebene ist für die CWR ein räumliches Muster festzustellen, das für einen Diffusionsprozess des Fruchtbarkeitsrückganges mit drei Komponenten spricht: von den Städten in den ländlichen Raum, innerhalb des Städtesystems hierarchieabwärts gerichtet und von Süd- nach Nordindien. Diese Verteilung lässt sich aber auch als Anpassung an geänderte sozio-ökonomische Bedingungen deuten, da ein entsprechender Wandel zuerst in den großen Städten und in Südindien aufgrund der dort traditionellen Außenorientierung der Bevölkerung einsetzt.

Die Untersuchungsergebnisse auf der individuellen Ebene sprechen dafür, dass Netzwerke, deren Verflechtungen vertikal und horizontal unterschiedlich intensiv sind (Hindu – Muslime, hohe – geringe Einkommen, Marktort – Dorf), die Diffusion des sozialen und ökonomischen Wandels steuern und diese Veränderungen den Rückgang der Geburtenhäufigkeit als Anpassung an neue Wertvorstellungen und Normen einleiten.

*Summary:* Using adjustment as well as diffusion analysis, this paper first sets out to discuss, against a background of empirical investigations, two views which tend to be presented as opposites. Each perspective serves to interpret the substantial explanatory force attributed to the education of women for causing the decline in fertility in India at meso- and at micro-level.

The hypotheses of adjustment and innovation diffusion do not exclude one another, but complement each other in their statements on regional deviations in fertility decline. At meso-level it is possible to establish a spatial pattern, which points to a diffusion process in the decline of fertility with three components: from towns to rural areas; from higher to lower classes of the social hierarchy in the urban system; and from southern to northern India. This distribution can, however, also be interpreted as adjustment to changed socio-economic conditions, since corresponding change sets in first in large towns and in southern India, due to the traditionally prevailing outward orientation of the population.

Findings at the individual level indicate that networks, the linkages of which differ in their vertical and horizontal intensity (Hindu – Muslims, high – low incomes, market town – village) steer the diffusion of social and economic change, and that this change initiates the decline in fertility in adjustment to new perceptions of values and norms.

### 1 Introduction

Calculations carried out by the United Nations showed that on October 12th, 1999 there were six billion people on earth, almost one sixth of which were living in India. Though the 1991 census had registered the number of inhabitants of that country as 847 million, data released by the Population Reference Bureau showed that by 1999 the figure had risen to 986.6 million. However, the decline in the natural growth rate from 21.6‰ (mean value in the period 1981–1983) to 18.7‰ (1995–1997), should not hide the fact that at present one fifth of the world wide population rise must be attributed to India. The absolute annual increase,

which showed its first decline since the 1921 census in the 1990s, should also be seen in the context of a population density of 300 inhabitants/km<sup>2</sup> and a 28% degree of urbanisation (both 1999). These evident dynamics throw up problems the agricultural state of India finds difficult to solve, be it in the creation of new jobs or in the improvement of the infrastructure, like schools or teacher training (BRONGER 1996, 87), and show in the need for continuous production increases in agriculture, in order to secure food supplies for the inhabitants. The steady rise in the population figures largely undoes the undeniable economic and social progress of the country, so that the question arises why, despite the repeatedly proclaimed family planning programmes, one has not succeeded in decisively reducing the number of births per woman as a critical growth component in population development.

<sup>\*)</sup> This contribution is dedicated with gratitude to Prof. Dr. JURGEN BAHR on the occasion of his sixtieth birthday.

## 2 Worldwide differences in fertility decline

By contrast with other countries and major regions of the earth Figure 1 provides evidence of the then as now high level of fertility in India. In 1999 the total fertility rate (TFR) of 3.4 children per woman surpassed that of all other developing countries (3.2), though it remains significantly below that of 3.8 in the countries of the Third World excluding China. The TFR in India comes off badly in comparison with the values achieved in South East Asia (3.0) or in Latin America (2.9), but relatively well in comparison with the overall level in South Asia (3.6) or in Africa south of the Sahara (5.8).

There are, however, not only considerable variations in TFR between the major regions, but also within the subcontinents at country level (Fig. 1). The range of fluctuations results chiefly from the onset and progress in the decline of fertility. Although it began in South America even before 1960, progress in particular states

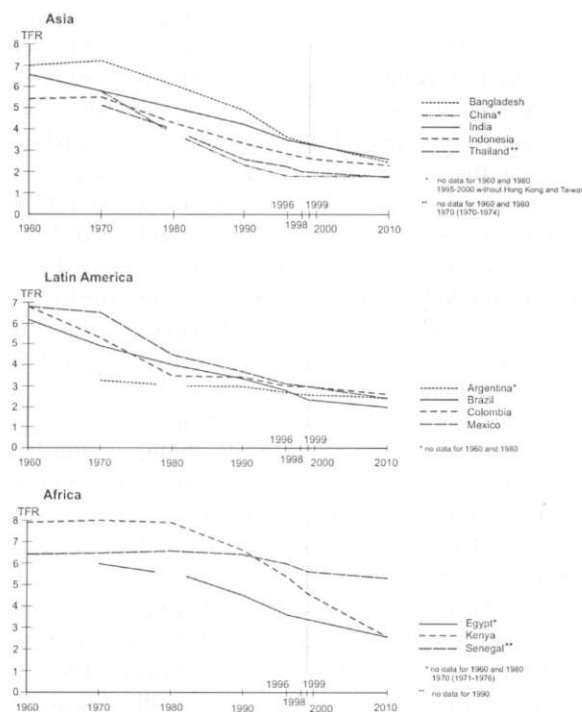


Fig. 1: Fertility transition in selected countries of the Third World (1960–2010)

Source: United Nations (Eds.): Demographic Yearbook 1990. New York; World Bank (Ed.) (1992): Population and the World Bank: Implications from eight case studies. Washington D.C.; Population Reference Bureau (Ed.): World Population Data Sheet 1990, 1999

Fruchtbarkeitstransition in ausgewählten Ländern der Dritten Welt (1960–2010)

differed substantially: in Colombia, TFR fell from 6.8 children per woman (1960) to 3.5 (1980); in Mexico, however, a corresponding value of 3.8 was only achieved in 1990, in spite of starting at the same point of departure in 1960. Kenya, on the other hand, showed the same percentage decrease as Mexico, though within a noticeably shorter time span, i.e. from 1990 (6.7) to 1999 (4.7), while in Senegal the TFR remains static at 5.7 children per woman (1999), similar to the remaining countries of Black Africa, with Niger retaining the maximum of 7.5. In Asia, too, a wide range can be observed. Though they pursue different population policies, China and Thailand present continually decreasing total fertility rates. With 2.0 children per woman, the TFR no longer reaches the level required for maintaining the population size; in the successful “Tiger states” it has been undercut for some time (BAHR 1999, 572). In Bangladesh a sustained decline in the fertility has only been observed since 1990, when the TFR dropped by 40% from 5.5 to 3.3 in the period up to 1999. The Islamic state thus does better than India, where the fertility decline, though continuous, is nonetheless proceeding too slowly to bring about a decisive reduction in the population dynamics which set in during the 1950s (GANS a. TYAGI 2000, 67).

A comparison at country level reveals but small success with the government’s birth control measures, although back in 1952 India, with its five-year-plan, was the first country to formulate targets such as the limitation of family size or greater spacing of births, in order to preserve the health of mothers and to promote the education of children (Archives 1997). Those responsible for policies at the time were to a high degree influenced by Malthusian thought (CALDWELL 1998) and convinced that natural growth of less than 15‰ before 1950 constituted an impediment to a general improvement of living conditions in an independent India. Considerations of the carrying capacity made the Indian government incorporate these modern thoughts on population policy in their planning. As a concept of reproductive health they became a guiding precept throughout the world thanks to the 1994 Cairo World Population Conference. Unfortunately, the translation into practice largely failed to meet with success. Though all the subsequent five-year-plans set targets for family planning (RAINA 1989), the Indian Government focussed too much on setting quotas in conjunction with monetary incentive systems. Too little attention was paid to socio-cultural traditions, and they were therefore bound to fail: “Ignorance, poverty, poor health and high mortality rate, wrong religious customs and traditions, lack of political will, populist greed for power, and a failure in generating people’s movement,

have given a major set back to the family planning programmes in the country" (PREMI 1991, 32).

In spite of this pessimistic statement there are definitely regions where family planning measures have led to success. In the South Indian state of Kerala, for instance, the 1990 TFR of 1.8 children per woman already failed to reach a level which would have maintained the population balance, whilst in Uttar Pradesh in the North, which is currently registering 160 million inhabitants, and thus the most heavily populated state of India, the number of inhabitants will be doubled within approximately 30 years. A high TFR of 4.8 children per woman (1997) continues to be the decisive factor; close to the comparable level of African states (Fig. 1), it contributes substantially to the natural population growth of 23.2‰ (1997).

What are the causes that contribute to these marked, large-scale differences in fertility decline in India? Every attempt at explanations needs to take into account that several factors in different combinations may lead to a similar TFR, i.e. there is no general theory on fertility transition (KIRK 1996; VAN DE KAA 1996: "anchored narratives").

Using the adjustment hypothesis as well as the innovation diffusion hypothesis, two points of view tending to present opposing standpoints, will therefore be discussed in the following against a background of empirical investigations. This will be followed by an attempt to present evidence for the importance of education for women in respect of the decline of fertility at meso- as well as at micro-level, and to interpret the effects of the indicator from the particular perspectives of each of the two theses.

### 3 Adjustment and innovation diffusion hypotheses

The adjustment hypothesis claims that the fertility decline is to be interpreted as a reaction of the reproductive behaviour of couples to changes in economic and social conditions, such as rising incomes, falling infant mortality, or declining influence of socio-culturally defined institutions (for instance religion, customs). High fertility in pre-industrial societies where traditions exert a formative influence, thus expresses the rational behaviour of parents, and the declining fertility rate reflects the assessment of advantage and disadvantage of the number of children as a consequence of socio-economic change (GUINANNE et al. 1994, 2). According to this thesis, the decline in fertility is an adjustment of the reproductive behaviour of couples to a social and economic structural change within society.

Even NOTESTEIN (1953) had already stressed the modernization of a society in order to explain the fertility transition. He was convinced that economic and social change shifted the cost-benefit balance of descendants from parents to favour children. Their number, especially that of sons, no longer stands for prestige, cheap labour or the social security of the family, but for qualitative targets like the support of the individual child in respect of education, health and opportunities in life that move to the foreground. For parents, the cost-benefit balance with regard to their children shifts from positive to negative. According to CALDWELL (1982) this reversal of wealth between the generations has the effect of limiting the number of their offspring. COALE and WATKINS (1986), however, were able to establish that irrespective of the economic and social structure of a region in Europe, the decline in fertility would have set in at approximately the same time. JONES (1990), too, stresses that economic growth is neither necessary nor sufficient to bring forth a decline in the number of births per woman. The influence of economic strength and its change play a subordinate role. In the 1990s the gross domestic product per inhabitant of Kenya (1997: US\$ 340) thus remained approximately constant, while more than doubling during the same period in Bangladesh, and therefore attaining the level of the East African state. Nevertheless, both these countries experienced a marked TFR decline of about 30% during the period 1990–1999 (Fig. 1). Thanks to corresponding observations, BONGAARTS and WATKINS (1996, 652) postulated the model of a moveable threshold value. It indicates that the regions of a country where a sustained fertility decline occurs first, have at that point in time already reached a high level of development; transition sets in later in the remaining regions of lower development. But the disproportionately sharp drop in the birth rate in Southern India, especially in Kerala, is inconsistent with the thesis, as Kerala is one of the poorest Indian states (MURTHI et al. 1950), and tends to be cited as an example for initiating a decrease in fertility despite low economic strength (BAHR a. GANS 1990). According to JONES (1990) as well as CLELAND and WILSON (1987), it is not in Kerala that social change, especially education, health services, access to radio and television, or the proximity of urban areas are of major significance as economic factors. COALE (1973), however, is of the opinion that three conditions must be met if social changes are to become effective:

(1) Parents must be aware of the possibility of birth control. (2) Methods of contraception must be known and available. (3) Parents opt for smaller families, i.e. for a smaller number of children.

There are great regional variations in any one state as to meeting those conditions, as evidence collected in Africa has shown. According to this, the application of contraceptive methods in relatively small areas is comparably high with that in developed states, and these sub-regions are undergoing a very rapid transition in their fertility (KALIPENI 1995, 298). The adjustment hypothesis with its strongly demand-based component is founded on change in a society on condition that an – above all economic – development, or modernization is taking place (BASU 1999, 250), and does not sufficiently reflect regional differences in existing norms and moral concepts, which may, however, decisively influence the reproductive behaviour of couples, for instance in religiously or socially defined groups (JONES 1990).

The innovation diffusion hypothesis claims to explain the fertility decline without accompanying decisive change in economic conditions, while linking living conditions in a region with the existing social and cultural actualities (CLELAND a. WILSON 1987; CALDWELL 1997). The innovation diffusion hypothesis is based on the spread of change in reproductive behaviour, which tends to involve a shortening of the period of time over which a woman has children, and/or an extension of the interval between possible births (cf. VAN DE KAA 1996, 421). Independent of social or economic changes in a particular region, the diffusion derives from the perceived advantage of couples to reduce the number of births with the help of contraceptive techniques, and is above all a consequence of the spreading of new norms and moral values along existing lines of communication and social networks (BAHT a. IRADAYA RAJAN 1990; KIRK 1996). BONGAARTS and WATKINS (1996) distinguish vertical and horizontal linkages in which peer groups may play a special role in the adoption of the new behaviour. In Bangladesh, according to investigations by CALDWELL et al. (1999, 77 ff.) it is thus above all in households which are open to schooling for girls, that opportunities for betterment of living conditions – such as improvements in transport and communications, electricity, health and education, and access to radio and television – are perceived and seized, that contraceptive methods for avoiding conception are disproportionally more often applied. A policy aimed at curbing population growth should therefore not only restrict itself to offering techniques, but also lower socio-cultural barriers, which impede the process of diffusion, by promoting information and communication. BASU (1999, 251) identifies three avenues which might be followed up: to put through formal school education for all, including girls; to improve freedom of spatial mobility for women; and to make access to the

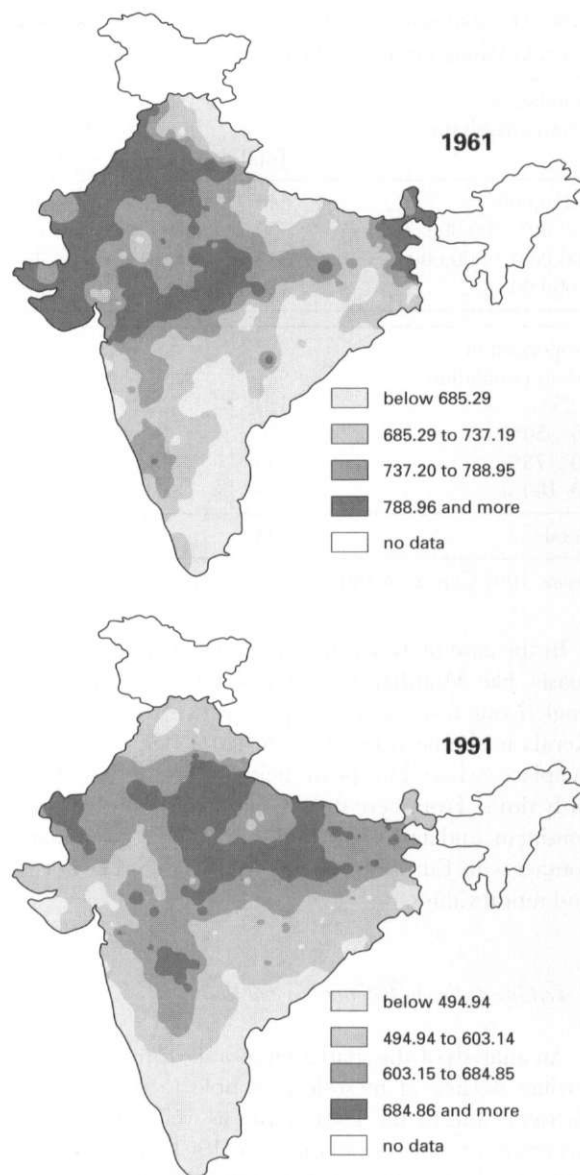


Fig. 2: Spatial distribution of the child-woman-ratio, 1961 and 1991

Source: 1991 Census of India; author's own calculation

Räumliche Verteilung der Child-Woman-Ratio 1961 und 1991

mass media more common. Education and training for women contribute to the decline in fertility for a number of mutually influencing reasons. Formal education strengthens the social status of women; they gain in autonomy within the family and thus in power to enforce their point of view; they develop new interests, and are more likely than illiterate persons to adopt new reproductive behaviour (CALDWELL 1982; Dyson a. MOORE 1983; MASON 1984; BASU 1992).



Table 1: Child-woman-ratio (CWR) dependent on numbers and proportion of the urban population in the districts of India, 1991

Child-Woman-Ratio in Abhängigkeit von Zahl und Anteil der städtischen Bevölkerung in den Distrikten Indiens (1991)

Number of urban inhabitants	Child-woman-ratio (CWR)			Number of districts
	Total population	Urban population	Rural population	
< 250,000	648	566	656	146
250,001–500,000	630	533	655	106
500,001–1,000,000	545	458	587	75
1,000,000 ≤	470	436	550	47
<hr/>				
Proportion of urban population	Child-woman-ratio (CWR)			
≤ 25%	640	541	650	263
25– 50%	556	480	591	89
50– 75%	500	454	566	15
75–100%	399	399	707	7
Total	603	515	636	374

Source: 1991 Census of India; author's own calculation

In the case of India, the large urban centres on the coasts, like Mumbai, Calcutta or Chennai, are to be singled out from a spatial perspective together with Kerala in southern India (GUILMOTO 1997). They are the places where Europeans held important bases from early times. From here they penetrated the Indian sub-continent, and it was here that Indian society first made contact with European culture and its different norms and moral values.

#### 4 Fertility decline in India at regional levels

An analysis of the spatial-temporal expression of the fertility decline at meso-level is able to draw on the district results of the 1991 census as well as on the age structure of the population in 1961. Fertility was estimated by the child-woman ratio (CWR), the number of under five year olds in relation to 1000 woman of child bearing age. The available data do not permit calculations of other quantities for characterizing fertility in the districts.

Based on a geographical information system, Figure 2 connects points of equal value for the CWR: quartiles in this case. A first glance at the isolines shows two demographic regions, the border of which roughly follows the Satpura Range (DYSON a. MOORE 1983). In 1961 and again in 1991 the values exceed the median, especially north of the line. It must be taken into account though, that in the North infant mortality, which can distort CWR, at most times clearly exceeds that in the South, so that actual fertility differences are more marked than can be recorded in Figure 2. The large-

scale contrast between North and South has increased further during the period of investigation. The lower quartile value thus decreases by 190 units or 28%, the upper one, however, only by 104 points or 13%. In 1991 all the districts of the southern states of Kerala, Tamil Nadu and Karnataka were to be found in the bottom quartile, while districts in the top quartile are increasingly located north of the Satpura Range, but chiefly in Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh.

Besides the contrast between Northern and Southern India, differences in fertility also exist between town and country. In principal, the CWR for the urban population was lower in 1991 than for those living in rural areas (Tab. 1). In addition, fertility declines in tandem with rising numbers, as well as with the increasing proportion of urban inhabitants. To a lesser extent this tendency also applies to the rural population. Only when the degree of urbanisation reaches at least 75%, is the tendency disrupted by extraordinary CWRs in rural areas. It is, however, a matter of a small number of cases, and more likely to be the effect of a young population structure than of reproductive behaviour.

The values presented in Table 1 point to a diffusion which, emanating from the metropolises, spreads to minor centres and finally reaches the rural areas. Social and economic change of a society starts out first in the large cities, as they are more likely to maintain contact with attitudes marked by western views. Investment in education and health safeguard a certain quality of available benefits. For instance, changed working and living conditions favour the dissolution of patriarchally structured family units, which in turn has a positive

Table 2: Gender-specific literacy quota, together with child-woman-ratio (CWR) for the districts in northern and southern India<sup>1)</sup>, 1991Geschlechtsspezifische Alphabetenquote sowie Child-Woman-Ratio (CWR) für die Distrikte in Nord- und Südindien<sup>1)</sup> (1991)

	Rural areas			Urban areas		
	Literacy quota in %		CWR	CWR	Literacy quota in %	
	Men	Women			Men	Women
Northern India	46.3	16.5	700	601	70.5	49.8
Southern India	59.1	38.9	461	398	79.1	64.2

<sup>1)</sup> Northern India: States of Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh

Southern India: States of Andhra Pradesh, Karnataka, Kerala, Tamil Nadu

Source: 1991 Census of India; author's own calculation

effect on the social status of women. New moral concepts, like progressive individualization and secularization, spread from the cities, where knowledge of contraceptive methods is most intensive and most easily available. In the centres information and communications networks are particularly dense and spread to the contiguous areas. Using the example of Bangladesh, CALDWELL et al. (1999) attribute great significance to those networks as being instrumental in considerably reducing births in the 1990s (Fig. 1), since they exerted a positive influence on the effectiveness of family planning. A prerequisite was, for instance, an improvement in the transport and communication infrastructure, so that information was able to spread faster by way of personal contacts, as well as through radio and television than before the 1990s. In summary, CALDWELL et al. (1999, 71) describe the development in one sentence: "The villages have been increasingly opened to the outside world". Declining fertility (Tab. 1), in tandem with the growing number and increasing proportion of the urban population, are to be interpreted as a consequence of an adjustment process as well as a diffusion process. However, the correlation of the CWR for the overall population with the degree of urbanization ( $r_s = -0.289$ ) as well as the standardized size of towns in the districts ( $r_s = -0.298$ ), though significant ( $\alpha = 0.01$ ), does prove to be small in absolute terms.

This is due to the large-scale differences in fertility between southern and northern India, which overlap the above-mentioned rural-urban gradient. The greater fall in births in the south speaks for the innovation-diffusion hypothesis, since in Karnataka, Kerala and Tamil Nadu low CWR values can be observed in rural as well as in urban areas (Tab. 2). Due to the traditional outside orientation of the population and the competition among different religious groups, which led to the promotion of education and health care at an early stage, Kerala in particular offered favourable conditions for a change in reproductive behaviour (BAHR a. GANS 1990). In 1981 the mean age of marriage of

women in the Kerala districts fluctuated between 17.8 and 20 years, in Uttar Pradesh between 14.5 and 17.9 years. At the same time, the proportion of married women aged 15–19 years varied from between 4% and up to 34% in Kerala, and between 24% and 86% in Uttar Pradesh (NUNA 1990). By 1997 the mean age of marriage of Kerala women had risen to 22 years in Uttar Pradesh to 19.6 years.

But there are also arguments in favour of the adjustment hypothesis: the early improvement of education and health care in Kerala, which, as everywhere in post-independent India, was initially mainly addressed in the towns, first also initiated socio-economic change there, and couples adjusted to it by changing their reproductive behaviour in response to higher opportunity costs for children. An indication for this interpretation is the distribution of infant mortality, which was strikingly lower in Kerala (12 per 1,000) in 1997 than in Uttar Pradesh (85 per 1,000), and had largely achieved a balance between towns with 15 per 1,000 and rural areas with 11 per 1,000 (Uttar Pradesh: towns 66 per 1,000, rural areas 89 per 1,000; source: Registrar General 1999, 129, 241).

The formal education of women in schools, which is repeatedly cited as the chief factor in strengthening not only their social status, and thus their autonomy in deciding on the number of children, also has the effect of decisively reducing fertility. The influence of the education of girls on the spatial distribution of the CWR in 1991 is shown clearly in the results of a multiple regression analysis (Tab. 3). The recorded variation of the CWR is almost entirely due to the literacy quota of women. They are more likely to present higher values in districts with a disproportionately high share of the urban population (Tab. 4). It is striking that the positive influence of the degree of urbanization on the distribution of the CWR remains small. Once again they conceal the large-scale differences between southern and northern India, which overlap the rural-urban gradient of fertility the regression analysis had

Table 3: Regression model for registering the child- woman-ratio (CWR) in the districts of India

Regressionsmodell zur Erfassung der Child-Woman-Ratio (CWR) in den Distrikten Indiens (1991)

Independent variable	Dependent variable			
	Regression coefficient	Child-Woman-Ratio for the total population $\beta$ -coefficient	Regression coefficient	$\beta$ -coefficient
Constants	772.3	–	645.3	–
Literacy quota of women	–5.2	–0.768*	– <sup>1)</sup>	– <sup>1)</sup>
Degree of urbanisation	0.13	0.018	–2.67	–0.357*
Recorded significance ( $r^2$ )	0.58	0.58	0.13	0.13
n	374	374	374	374

\* significance level  $\alpha = 0.01$ <sup>1)</sup> The literacy quota variable for women was not considered.

Source: 1991 Census of India; author's own calculation

postulated. The values given in Table 2 with reference to the women's literacy quota thus point to

- considerable gender-specific variations,
- to noticeably higher values in urban than in rural areas, and
- to a marked north-south gradient with a wider range among women than among men.

This contrast between northern and southern India also appears in the CWR. Though fertility in the rural areas of particular major regions is 16%–18% higher than in urban areas, a comparison between northern and southern India shows that the CWR in the rural areas of the South is 23% lower than in the towns of the North.

The evident delay in the decline of the birth rate in the North directs attention to socio-cultural traditions which impede the spreading of new ways of reproductive behaviour. Even the report on the 1931 Census recognized the social context as a significant barrier to restricting the population increase, when stating, among other things, that control of the birth rate meets

with considerable difficulties in a country "where the vast majority of the population regard the propagation of male offspring as a religious duty and the reproach of barrenness as a terrible punishment for crimes committed in a former incarnation" (CALDWELL 1998, 686).

Using the correlations represented in Table 4, it is possible to identify the diverse district-level indicators which point to the complex network of effects of the socio-cultural traditions. The positive correlation between CWR and sex ratio, for example, is thus not only an expression of the disproportionately higher mortality rate among women in districts with a higher than average fertility, but also of the low regard in which they are held for economic and religious reasons (ARNOLD et al. 1998; ATKINS et al. 1997; negative correlation between CWR and earnings contributions among women). Parents' preference for sons also acts as a constraint against a sustained decline in fertility. According to investigations carried out by CALDWELL et al. (1982), DAS GUPTA (1990) or KISHOR (1993), the higher mortality of women must chiefly be attributed

Table 4: Spearman's correlation coefficients for registering socio-cultural conditions at meso-level

Rangkorrelationskoeffizienten zur Erfassung sozio-kultureller Traditionen auf der Mesoebene

Indicator		1	2	3	4	5
Child-woman-ratio	1	1.000	–0.715*	–0.289*	–0.312*	0.525*
Literacy quota for women in %	2	–0.715*	1.000	0.509*	0.072	0.249*
Degree of urbanisation (in %)	3	–0.289*	0.509*	1.000	–0.077	0.192*
Participation in gainful employment of women (in %)	4	–0.312*	0.072	–0.077	1.000	–0.614*
Sex ratio (men per 1,000 women)	5	0.525*	–0.249*	0.192*	–0.614*	1.000

\* significance level  $\alpha = 0.01$ 

Source: 1991 Census of India; author's own calculation

to a specifically poor diet as well as insufficient medical care for girls by comparison with provisions for boys. In this context it is reasonable to consider the marital behaviour (LIBBEE a. SOPHER 1975; DYSON a. MOORE 1983). Especially in northern India, marriages are arranged: parents have to pay a dowry, girls leave home when still quite young, and thus cease to be workers in the parental household at an early age. Moreover, they are often forbidden to leave the home area, so that they have few opportunities in the labour market, and only in particular segments of it. According to CALDWELL's "wealth flow theory" (1982), the traditional ways of behaviour imply a clear preference for sons.

The results of the regression and the correlation analysis (for instance negative correlation between women's literacy quota and sex ratio) at the spatial meso-level point to the influence of school education of women to break up socio-cultural traditions with their evidently positive consequences for fertility. The education of women tends to be accompanied by a strengthening of their social status as they marry at a later age and gain in autonomy, including decisions on the number of children they are going to have. In urban areas the status of women is higher than in rural ones; in southern India they are better off than in the North of the country. A comparable pattern can be established for the distribution of the CWR, which says something for a diffusion process of the decline in fertility with four components:

- from urban to rural areas,
- down the hierarchy within the urban system,
- from southern to northern India, and
- from the coast to the interior.

The spatial qualities in the fertility decline can, however, also be interpreted as adjustment to changed socio-economic conditions since educated women in metropolitan areas and in southern India initially led the way by being aware of the necessity of education for the social advancement of their children, and of the costs involved, and are more likely to limit the number of birth per woman.

## 5 Education of women and fertility at individual level

### 5.1 Data base

In view of the decline in the fertility rate, the marriage age of women and the couple's preference for sons as an expression of socio-cultural traditions are of great significance as well. An early marriage exposes women to a longer period of potential pregnancies. The relevant statements that educated women are

more likely to marry later, to show less preference for sons and to want fewer children than women without schooling, are examined on the basis of a standardized interview of 1,000 households in four villages north west of Delhi (GANS a. TYAGI 2000).

The interviews of the households consisted of two parts, the first one addressing size and structuring of the household as a whole, together with general attitudes concerning the social status of women. The oldest male member of the family was asked to comment. The second part dealt with one couple of a household, the youngest as a rule. In this case it was primarily a matter of investigating variables which describe reproductive behaviour like the age of marriage, the birth of children, or attitudes to family planning. In the second part an attempt was made on principle to interview the women themselves.

### 5.2 Findings

The mean age of marriage of all the women under investigation ( $n = 1000$ ) in the four villages was 17.1 years. At the point of marriage 70% of them had not reached that age, and 30% were at most 15 years old. A differentiation of the mean age of marriage with regard to temporal development points to a definitely positive dynamic (Fig. 3). The mean age of marriage has been rising in the course of time. Whilst women who married in the period 1972–1976 were on average 16 years old at the time, the mean rose by about one year with every subsequent marrying cohort. The increase in the tendency also applies to the lower and

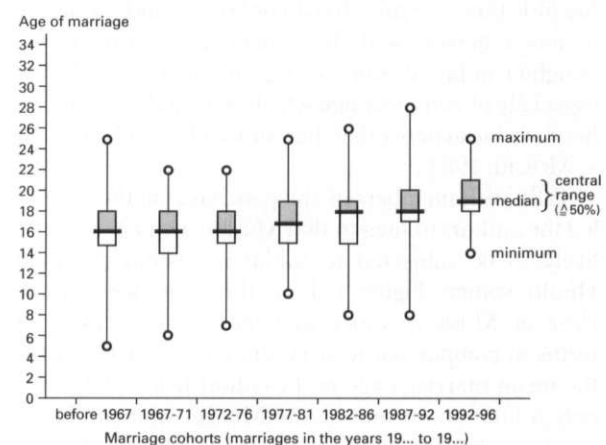


Fig. 3: Development of the age of marriage of women in four villages northwest of Delhi

Source: author's own survey 1996/97

Entwicklung des Heiratsalters der Frauen in vier Dörfern nordwestlich von Delhi



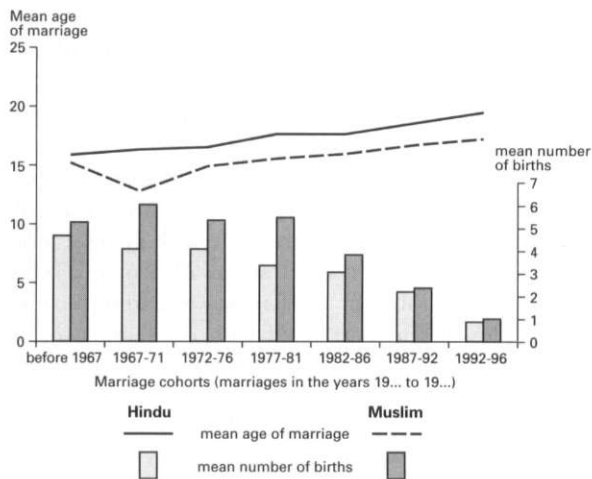


Fig. 4: Mean age of marriage and mean numbers of births of Hindu and Muslim women according to marriage cohorts  
Source: author's own survey 1996/97

Mittleres Heiratsalter und mittlere Zahl der Geburten von Hindu- und Muslimfrauen nach Heiratskohorten

upper limits of the central sector with 50% of the values. It is striking that that it was only in the youngest cohort that the minimum showed a distinct increase to 14 years, although the minimum age of women at marriage has been legally laid down as 18 years (GOSALIA 1999). Marriage at an early age is a sure indication of traditional behaviour, which favours high fertility. Marriage is arranged by the parents of the couple. The bride leaves the parental home and moves to that of her groom, often over great distances. She must then cut back on ties with her own family, and, due to her age, has little time to establish self-confidence and the ability to assert herself, and this limited autonomy of the daughter-in-law favours a large number of children, especially of sons, through which she is able to build up her own social network in her husband's family (DYSON a. MOORE 1983).

Talks with members of the panchayat in the villages led the authors to suggest that Muslim women are more likely to be subjected to traditional behaviour than Hindu women. Figure 4 shows the lower age of marriage of Muslim women and the greater number of births in comparison with Hindu wives. For the latter, the mean marriage age in the cohort before 1967 was only a little above that of the Muslim women. There was a step-by-step increase after the 1970s, also chronologically staggered among the Muslims, though not to the same extent. The development in the number of births shows a marked division between the two denominationally defined groups. Whilst there is a small, but nonetheless continuous decline among the

Hindu wives from the 1967/1971 marriage cohort, there is none among the Muslims. In this it must be borne in mind that women from the 1982/1986 cohort have not yet reached their final fertility, and that numbers are therefore lower. The Muslim population's approach continues to be very much determined by tradition, i.e. religion, customs or patriarchally structured family formations are steering factors in population production. In comparison to Hindus, Muslim women are distinctly limited in their freedom of spatial movement (Tab. 5), as shown by the permission needed to leave the domestic environment or the compulsory wearing of the *purdha*. *Purdha* signifies the spatial and social segregation of women from men in daily life, with the consequence, that, for instance, women are prevented from pursuing certain activities outside the home. Amongst other things, these restrictions also have a negative effect on school attendance. Muslim girls are very much limited in their freedom of movement, are only rarely permitted to attend school, and are therefore missing out on becoming acquainted with views other than those held in the family. Three-quarters of the Muslims under investigation came from families which show next to no open-mindedness towards school education for girls or women, whilst the corresponding proportion among the Hindu women reaches only 31%. Even if their age of marriage is higher, both groups show small differences in attitude in matters like marriage or the preference for sons, which influence the approach to population (Tab. 5).

The significance of education for the breaking up of socio-cultural traditions and reproductive behaviour can be gleaned from Table 6. The larger the proportion of educated women, or girls, within a family, the higher will be their mean age of marriage, the smaller the extent of arranged marriages, and the wider their spatial freedom of movement. The growing population of educated women is matched by the loss of importance attached to the preference of sons, the fall in the number of additional births to fulfil that desire, and a preference for smaller families. The tendency described above applies independent of membership of a particular religion, although Table 6 testifies to a markedly stronger clinging to socio-cultural traditions among Muslim households.

High incomes and membership of higher castes exert a positive influence upon the open-mindedness of Hindu families towards sending female members to school (Tab. 7). Besides social criteria, settlement size and available infrastructure, schools play a particularly important role (GANS a. TYAGI 1999). It so happens that 46.5% of the Hindu families, where at least 50% of the women and girls can read and write, live in the market

Table 5: Description of the socio-cultural conditions of Hindu and Muslim women, aged 15 to below 45 years, in accordance with selected indicators

Indicators	Hindu women (n = 587)	Muslim women (n = 147)
Wearing of <i>purdah</i> <sup>1)</sup>	88	99
Permitted to move freely in the village <sup>1)</sup>	37	69
Proportion of women having at least primary schooling (in %)	44	13
Parents consulting daughters before marriage <sup>1)</sup>	29	20
Couples' desire for a son <sup>1)</sup>	85	92
Mean age of marriage in years	17.7	15.6

<sup>1)</sup> affirmative answers in %

Source: author's own survey 1996/97

town of Charthawal, whereas the percentage in the sample total is a mere 37.5%. Remote Hathawal (with primary and secondary school), and Patti Kalyan on a major road, but supplied only with a primary school, remain below the average. Central place structure and social differentiation characterize horizontal and vertical linkages for diffusion of social change the couples adapt to in their reproductive behaviour.

## 6 Outlook

The paper verifies that at meso- and at micro-level education of women is of great importance for explaining the decline in fertility, and that the influence of this

factor can be interpreted from the perspective of adjustment as well as from the viewpoint of the innovation diffusion hypothesis. In India at least, the education of women has a key role in future population development insofar as it contributes decisively to the breaking up of traditional behaviour in the heavily populated states of the North and to a greater openness towards family planning (GANS a. TYAGI 2000), thus creating conditions for the acceptance of new reproductive behaviour, and that in adjustment to existing social and economic change as well as in consequence of the spreading of new norms and moral values.

Adjustment and innovation-diffusion hypotheses do not exclude but rather they complement one another in their explanation of regional variations in the decline

Table 6: Socio-cultural traditions and open-mindedness of families towards the education of girls or women questioning those women aged between 15 and below 45 years of age

Sozio-kulturelle Traditionen und Aufgeschlossenheit der Familien gegenüber der Schulbildung von Mädchen bzw. Frauen (15- bis unter 45jährige befragte Frauen)

Indicators of traditional attitudes in %	Proportion of women or girls with school education or school attendance respectively, for all female family members			
	Hindu women		Muslim women	
	0-25	50.1-100	0-25	50.1-100
Mean age of marriage in years	16.7	18.0	15.5	16.4
Arranged marriage <sup>1)</sup>	83.0	63.4	81.6	60.0
Reduced freedom of movement <sup>1)</sup>				
wearing of <i>purdah</i>	97.1	81.2	99.2	100.0
restriction to domestic sphere	47.1	28.2	74.2	46.7
Wish to have a son	93.7	77.9	96.0	66.7
Were there additional births in order to fulfil this wish <sup>2)</sup>	57.1	44.1	57.0	75.0
Correct number of children <sup>2)</sup>	70.9	83.3	15.8	26.7
n	206	245	125	15

<sup>1)</sup> Affirmative replies in % concerning respective category of school education

<sup>2)</sup> Statements of less than 3 children as % of all responses

Source: author's own survey 1996/97

Table 7: Income and caste membership of Hindu families with varying degrees of open-mindedness towards the school education of their female members

Einkommen und Kastenzugehörigkeit von Hindufamilien mit unterschiedlicher Aufgeschlossenheit gegenüber der Schulbildung weiblicher Mitglieder

	Proportion of women or girls (in %) with school education or school attendance of all female family members	
	0 to 25	50 to 100
Income (rupies per year)		
average	28,430	51,190
median	18,000	36,100
Caste		
dominant caste	28.7%	38.0%
scheduled caste	28.2%	6.9%

Source: author's own survey 1996/97

of fertility (GUINANNE et al. 1994; MASON 1992). Investigations at individual level indicate that networks, the linkages of which display vertically and horizontally differing intensities (Hindu – Muslim; high – low incomes; market town – village) steer the diffusion of social and economic change, which in turn initiate the decline in fertility as an adjustment to new norms and moral values.

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