

RICH-POOR GAP IN UTILIZATION OF DELIVERY CARE SERVICES IN INDIA, 1992-2005¹

ABSTRACT

CONTEXT & OBJECTIVE: This paper analyses the trends and patterns in utilization of antenatal care and skilled birth assistance among poor and non-poor mothers in India and three contrasting states, namely, Uttar Pradesh, Maharashtra and Tamil Nadu using data from three rounds of National Family Health Survey (NFHS) conducted during 1992-2005. Further, an attempt has been made to investigate the relative position of public and private health facilities in addressing the need for skilled birth attendance, especially among the poor mothers. Finally, the association of salient socio-economic, demographic and cultural factors with utilization of antenatal care and skilled birth assistance are examined.

METHODS: The poor and non poor are estimated separately for rural and urban areas using state specific poverty line cut-offs points given by Planning Commission. Bivariate analyses, ratio b/w non-poor and poor, concentration curve & concentration index, and logistic regression models were used to understand the trends, pattern and predictors of economic inequalities in utilization of delivery care services.

FINDINGS & CONCLUSION: Results indicate the sluggish progress in utilization of antenatal care and skilled birth assistance in India and selected states during 1992-2005. However, large inequalities in utilization of antenatal care and skilled birth assistance by economic status have been observed during 1992-2005. The rural-urban differences in utilization of delivery care were enormous. Poor rural mothers were significantly at disadvantageous position relative to non-poor urban mothers in India and selected states. The state level differences in utilization of delivery care remained stark, and the multiplicity in factors associated with utilization of delivery care services across states calls for a concerted state specific policy response to tackle the equity issues in maternal health care in India.

Keywords: Poverty; economic inequality; antenatal care; skilled births attendance; non-poor vs. poor ratio; concentration curve and concentration index; India.

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INTRODUCTION

The emphasis on two out of eight critical UN Millennium Development Goals (i.e. reducing *under five mortality* by two-thirds between 1990 & 2015; and reducing *maternal mortality ratio* by three quarters between 1990 & 2015) epitomise the relevance of these factors in global efforts towards human development and alleviation of poverty (Freedman *et al* 2007; Rosenfield *et al* 2006; WHO 2004). It also underlines the important linkages between improvement in maternal health and development process, as poor maternal health may negatively affect child health, reduce women productive capacity, lowers participation in economic activities, and sabotages the poverty alleviation programme (Nanda *et al*, 2005). The completion of four major global safe-motherhood initiatives viz. Averting Maternal Death and Disability (AMDD), Impact, the Skilled Care Initiative (SCI), and ACCESS after the achievement of 20th anniversary of global safe-motherhood movement highlights the need for renewed focus on reducing maternal deaths.

Recent global estimates of maternal mortality indicate that more than half a million of women died due to pregnancy related causes in 2005 (WHO/UNICEF/UNFPA/The World Bank, 2008). Large proportion of these maternal deaths is concentrated within developing countries. Of the total maternal deaths in 2005, 99% occurred in developing world, and Sub-Saharan Africa and South Asia alone account for 86% of total global maternal deaths (WHO/UNICEF/UNFPA/The World Bank, 2008). Further, the risks of maternal deaths are not uniformly distributed. In spite of declining maternal mortality, the progress has been slow and uneven, both across and within countries. (Collins *et al* 2007; Hatt *et al* 2007; Filippi *et al* 2006; Koblinsky *et al* 2006; Lawn *et al* 2006; Stanton *et al* 2006; Graham *et al* 2004; DeBrouwere 1998). The conspicuous variations in maternal mortality are reflected through inequities in access to maternal health care such as prenatal care, skilled birth attendance, and post natal care on various economic, geographic and social scales (Singh *et al* 2009; Mohanty & Pathak, 2009; Pathak & Mohanty 2009; Anwar *et al* 2008; Houweling *et al* 2007; Say & Raine, 2007; Wirth *et al* 2006; Salam & Siddiqui 2006; Gwatkin, 2005; Gwatkin *et al* 2000).

Among developing countries, India contributes largest sum of births per year (27 million) in the world and alone accounts for the 20% of global maternal deaths (Mavlinkar *et al* 2008). This magnitude clearly suggests that India's future progress towards reducing the maternal mortality will be crucial in the global achievement of Millennium Development (MDG-5). But inadequate maternal health care with poor organization coupled with stringent social-economic and cultural constraints demands significant shift in programme priorities to increase the service coverage and enhance the accessibility to all sections of population.

According to recent estimates, nearly 28 percent of Indian population lived below the poverty line with large inter-state variations (Planning Commission, 2007). The poverty is largely concentrated in the central and eastern states of India viz. Uttar Pradesh, Madhya Pradesh, Chhattisgarh, Bihar, Jharkhand and Orissa where poverty is significantly higher the national average and account for 55% of poor Indian population. Importantly, majority of these states also contributes to nearly half of maternal deaths in India during 2004-06 (SRS, 2009; Ram & Singh 2004). On the contrary, most of the western and southern states of India viz. Maharashtra, Gujarat, Andhra, Karnataka, Tamil Nadu and Kerala are economically and demographically advanced than northern and eastern states in India (Dyson & Moore 1983; Bose 1991; Bhat & Zavier 1999; Griffith *et al* 2002; Pathak 2009). These states account for a miniscule of 17% maternal deaths in the country in 2004-06 (SRS, 2009). This highlights that any periodic scrutiny of inter-state differentials in maternal health care remains critical for the monitoring and improvement of maternal health in India.

Several scientific research and intervention studies in past few decades have identified the three key elements to reduce maternal mortality and improve neonatal health i.e. *family planning, skilled birth assistance for all deliveries, and access to emergency obstetric care for all women with life threatening complications* (Freedman *et al* 2007). Interestingly, India was the first country in the world to launch the official Family Planning Programme (FPP) in 1951 with a focus on checking the population growth. This FPP was later renamed as Family Welfare Programme (FWP) in 1977 with the integration of maternal and child health component, realising the positive association between falling birth rate and improved infant and child survival. India further revamped her Maternal and Child Health (MCH) programme to Child

Survival and Safe Motherhood Programme (CSSM) in 1992 in tune with the International Safe Motherhood Conference-global undertaking to reduce maternal mortality, in Kenya in 1987. The CSSM programme was later integrated into the Reproductive and Child Health (RCH) programme in 1997-98 to improve the maternal and child health, and meet the needs of family planning services, especially among the poor and underprivileged. In the same league, the recently launched National Rural Health Mission (NRHM, 2005-12) focus on providing effective health care to rural population throughout the country, with special emphasis on 18 states having weak public health infrastructure. This mission document attempts to synergise the health issues with determinants of health like sanitation & hygiene, nutrition and safe drinking water. Most importantly, it primarily aims to improve the availability, accessibility, affordability, and quality of effective health care services to rural population, particularly among poor, underserved women and children.

Previous studies have highlighted the socio-economic gradient in utilization of maternal health care in context of developed and developing countries. However, very limited studies have been carried out from equity lens to systematically understand the trends and regional patterns in socioeconomic differentials in field of maternal health care utilization in Indian context. It is important to glean better understanding of such trends and regional dimensions of socioeconomic inequalities in maternal health care across rural-urban sub-groups of population for better monitoring of policy indicators and targeted intervention programmes. Therefore, the present study is an endeavour to understand the inequalities in utilization of antenatal care and skilled birth assistance in India, and three contrasting states, namely, Uttar Pradesh, Maharashtra and Tamil Nadu by residence (urban vs. rural) during 1992-2005. Further an attempt has been made to quantify the relative contribution of public and private health care providers in safe-motherhood programme. Finally, the roles of salient socioeconomic, demographic and cultural factors have been examined to understand the inequalities in utilization of antenatal care and skilled birth assistance in India and selected states.

Following three states (Uttar Pradesh, Maharashtra and Tamil Nadu) have been included in the study as testimony to highlight the regional dimensions of socioeconomic inequalities within country and between states; considering that all the three states significantly vary in their

socioeconomic, demographic, geographic and cultural profile (IIPS & Macro International 2007; also see **Table 1**).

METHODS

Data Source

The data for the present study are used from the three rounds of National Family Health Survey (NFHS) conducted during 1992-93, 1998-99 and 2005-06 (IIPS & Macro International, 2007; 2000; 1995). These surveys are nationally representative and cover more than 99% of Indian population. These surveys are Indian version of Demographic Health Survey and provide consistent and reliable estimates of fertility, mortality, family planning, utilization of maternal and child health care services, and other related indicators at both national and state level.

Outcome measures

The present study measures two outcomes variables i.e., antenatal care in first trimester with three or more ANC visits, and skilled birth assistance. Both the outcomes measures are treated as binary outcome in the scheme of analyses. The 2005–06 NFHS collected information regarding ANC visits for last birth in the five years preceding the survey; the 1998–99 NFHS collected information for the last two births in the three years preceding the survey; and the 1992–93 NFHS collected information for the last three births in the four years preceding the survey. To make the estimates comparable, antenatal care visits in first trimester and three or more ANC visits for the last live birth during the three years preceding the survey period were analyzed.

During the 1998–1999 and 2005–2006 surveys, the questions on births attended by skilled health professionals were asked to mothers about last two births with a reference period of three and five years respectively, while in the 1992–1993 survey, it was asked to mothers for three births during last four years preceding the survey. To make estimates comparable, the births attended by skilled health professionals for the last two births in the three years preceding the survey were estimated uniformly for all three NFHS. Births assisted by medical professionals, such as a doctor, an Auxiliary Nurse Midwives (ANM)/nurse/midwife/Lady

Health Visitor (LHV) or other health personnel, are termed ‘births attended by skilled health professionals’ or ‘medical assistance at delivery’.

Covariates

The present study included a list of theoretically pertinent socioeconomic and demographic variables in the analyses. This included poverty status of mother, maternal education, age of mother at delivery (in completed years), maternal education, paternal education, place of residence (urban vs. rural), parity, pregnancy complications, mass media exposure, age difference with head of household (proxy to status of woman), caste groups, religion, and time dummies.

We have constructed the wealth index for India and states of Uttar Pradesh, Maharashtra and Tamil Nadu, separately for urban and rural areas, for all three rounds of NFHS. The wealth status is estimated from a set of economic proxies (Filmer & Pritchett 2001; Montgomery *et al.* 2000; O’Donnell *et al.* 2008; Vyas & Kumaranayake 2006), by using the Principal Component Analysis (PCA). STATA 10.0 is used in the analyses (Statacorp 2007). From the composite wealth index, a percentile distribution was estimated, and the cut-off point of the poor and non-poor are made for rural and urban areas separately, using country and state-specific poverty estimates (Planning Commission 2007).

ANALYSES

We estimated the weighted prevalence of antenatal care/prenatal care and skilled birth assistance by economic status of mothers and place of residence using national weights during 1992-2005. We also calculated non-poor vs. poor ratio for antenatal care and skilled birth assistance. A ratio of 1 indicates parity in use of antenatal and skilled birth assistance among non-poor and poor mothers. We estimated the concentration curve (CC) and concentration index (CI) to depict the inequalities in utilization of delivery care by economic status (O’Donnell *et al.* 2008). A concentration index is a measure of this inequality and is defined as twice the area between the concentration curve and the diagonal, and it varies between -1 to +1. The closer the value to 1 (absolute), the more unequal is the delivery care (antenatal care and skilled birth assistance) and the closer the value to 0, more equal is the distribution of delivery care. The

declining values of concentration index over time suggest increasing inequality and vice-versa. Binary logistic regression models were used to assess the adjusted effects of socio-economic and demographic characteristics on the utilisation of delivery care among poor and non-poor mothers (Retherford & Choe, 1993). The data of three periods of NFHS have been pooled to examine the effect of time dummies on the utilisation of delivery care.

RESULTS

Trends in prenatal care (PNC) and skilled birth assistance (SBA)

The utilization of prenatal care (PNC) among mothers in India, on average, increased by 14 percentage points (from 21.6% in 1992-1993 to 36.0 % in 2005-2006) (**Table 2**). However, this increase in utilization of PNC, on average, remained pro-rich and pro-urban in India; the utilization of PNC among urban and non-poor mothers increased by 20 and 14 percentage points respectively (from 38.2% in 1992-1993 to 58.0% in 2005-2006, & 28.5% in 1992-1993 to 42.7% in 2005-2006). The inter-state gap and rural-urban differentials in utilization of PNC remained extensive during study period (**Figure 1**). The largest increment in utilization of PNC (32.7 percentage points) was observed in Tamil Nadu (from 42.3% in 1992-1993 to 75.0% 2005-2006) while least increase (6.5 percentage points) was observed in Uttar Pradesh (from 9% in 1992-1993 to 15.5% in 2005-06).

The non-poor to poor ratio elevated from 3.1 in 1992-1993 to 3.7 in 2005-2006 suggestive of increasing rich-poor gap in utilization of PNC in India (**Table 3b**). The concentration index (0.35, 0.37 & 0.33 in 1992-93, 1998-99 & 2005-06) and concentration curve also indicates that poor mothers were disadvantageous relative to their counterparts in utilization of PNC in India (**Figure 2**). The economic inequality in utilization of PNC was more pronounced in urban India than the rural counterparts cutting across states during all three NFHS. Again, the inequality was highest in Uttar Pradesh, followed by Maharashtra and least in Tamil Nadu during 1992-2006.

On the other hand, the utilization of skilled birth assistance (SBA) among mothers in India, on average, increased by 13 percentage points during 1992-2005 (**Table 2**). However, we found glaring economic gradient and rural-urban disparities in the levels and changes in utilization of SBA in India and selected states during the study period. For instance, during 2005-06 NFHS, only 19% of poor mothers sought SBA relative to 58% non-poor mothers in India. Further, there was a meagre improvement in SBA of 1.8 percentage points (from 17.1% in 1992-1993 to 18.9% in 2005-06) among poor mothers, in contrast with 11.3 percentage points (from 46.4% in 1992-1993 to 57.8% in 2005-06) among non-poor mothers in India. Though, the rural non-poor mothers experienced larger increment (13.7 percentage points; from 26.8% to 40.2% in 2005-06) than urban non-poor mothers (7.7 percentage points; from 70.1% in 1992-93 to 77.8% in 2005-06) in uptake of SBA, this may largely be due to difference in utilization of SBA levels in the base periods.

The inter-state variation in utilization of SBA also remained substantial during 1992-2005. Progressive states like Tamil Nadu, recorded highest increment (20.3 percentage points; from 73% in 1992-93 to 93.3% in 2005-06) in utilization of SBA, while the poorly performing states like Uttar Pradesh lagged behind (11.0 percentage points; from 17.8% in 1992-93 to 28.8% in 2005-06) in utilization of SBA during 1992-2005 (**Table 2**). Evidently, poor-mothers from rural areas in India and all three selected states were performing better in utilization of SBA than urban poor mothers. For example, the SBA among rural poor mothers improved by 3 percentage, 6 percentage, 12 percentage and 27 percentage points in India, Uttar Pradesh, Maharashtra and Tamil Nadu respectively during 1992-2005. However, it declined by 5 percentage, 13 percentage and 8 percentage points among urban poor mothers in India, Uttar Pradesh and Maharashtra; and marginally improved in Tamil Nadu by 15 percentage points during the study period.

The economic inequality in utilization of SBA over the study period remained plateau in India, and significantly varied by place of residence (rural vs. urban) across selected states (**Table 3a**). The non-poor to poor ratio in SBA consistently increased (2.7, 3.1, & 3.1 in 1992-1993, 1998-1999 & 2005-06 respectively) cutting across the place of residence in India during 1992-2005, implying that the poor mothers were at disadvantageous position than their counterparts. The concentration curve and concentration index (0.31, 0.30 & 0.27 in 1992-1993,

1998-1999 & 2005-06 respectively) indicates the economic inequality in utilization of SBA remained extensively large and marginally changed over the period of study (**Figure 2**). The concentration index suggests that economic inequality in utilization of SBA was higher in rural areas in India, but the same was not true across states. Higher inequality in utilization of SBA was observed in Uttar Pradesh (CI: 0.38, 0.34 & 0.32), followed by Maharashtra (CI: 0.25, 0.25 & 0.17) and least in Tamil Nadu (CI: 0.14, 0.08 & 0.03) during all three rounds of NFHS.

Source of health care providers and skilled birth assistance

Here, we attempted to investigate the trends, patterns and changes over time in the role of health care providers in meeting the need for skilled delivery care services among mothers by economic status in India and selected states. We have categorised the source of health care providers in four broad groups: (i) unskilled child birth at home; (ii) skilled child birth at home; (iii) child birth at public health institutions²; (iv) child birth at private health institutions³. **Table 4** presents the skilled birth assistance by source of health care providers in India and selected states by economic status and place of residence during 1992-2005.

Result indicates that majority of child births in India were unskilled and delivered at home without skilled medical assistance, cutting across economic status, place of residence, and time. Though the coverage of institutional deliveries (delivery at public/private health institutions) increased over time in India (26.8% to 34.1% in 1992-1998 & further to 41.1% in 1998-2006), the progress was sluggish and inequitable. In spite of the decline in coverage of unskilled home deliveries during the period of study (63.8% to 57.1% in 1992-1998; 50.5% in 1998-2006); more than half of babies were given birth without any skilled medical assistance in India. This figurative average decline in unskilled home delivery masked significant socioeconomic and spatial variations, as unskilled home delivery were largely concentrated among rural-poor mothers across selected states during 1992-2005. For example, the average

² Child birth at public health institution constitutes of the following: delivery at government or municipal hospital; government dispensary; urban health centre (UHC)/urban health post (UHP)/urban family welfare centre (UFWC)/community health centre (CHC)/rural hospital/primary health centre (PHC)/sub centre (SC)/other public health facility.

³ Child birth at private health institution constitutes of the following: NGO/Trust hospital/Clinic; Private hospital/maternity home/clinic; other private health facility.

decline in coverage of poor mothers varied from 91.7% to 86.4% in Uttar Pradesh during 1992-2005; from 72.0% to 59.8% in Maharashtra from 1992-2005; and 45.3% to 17.0% in Tamil Nadu. The scenario becomes further grave when disaggregated by rural and urban divide. Only a miniscule proportion of deliveries at home in India were assisted by skilled medical health professionals (9.4% to 8.4% in 1992-1998; 8.4% in 1998-2006) with notable inter-state variations.

On average, the coverage of deliveries at public health institutions slightly increased (15.0% to 16.3% in 1992-1998; 19.1% in 1998-2005) during 1992-2005, but this increase was largely observed among the non-poor mothers than the poor-mothers (**Table 4**). Interestingly, the increase in utilization of SBA from private health institutions increased faster than the public health institutions. However, the alarming point is the “leakage” in utilization of SBA from public health institutions towards non-poor mothers, and precursory shift of the poor mothers for SBA towards the private health institutions in India, most likely due to concerns for the poor quality of care at public health institutions.

The disaggregated scenario of the utilization of SBA by source of health care providers at the state level highlights tremendous inter-state variances in seeking SBA by economic status and place of residence. In complete contrast with Uttar Pradesh, majority of births in Tamil Nadu were medically delivered at public health institution (34% to 51.1% in 1992-2005), followed by private health institutions (30.8% to 39.4% in 1992-2005). On the other hand, majority of births were delivered at private health institutions (22.5% to 40.2% in 1992-2005), followed by public health institutions (22.7% to 27.1% in 1992-2005) in Maharashtra. The proportions of unskilled births delivered at home were miniscule in Tamil Nadu followed by Maharashtra, and were highest in Uttar Pradesh during the study period.

Determinants of prenatal care (PNC) and skilled birth assistance (SBA)

The results from the bivariate analyses provided clear evidence of the socioeconomic gradient in utilization of PNC and SBA in India. In this section, we estimated binary logistic regression models considering the dichotomous nature of dependent variables i.e., prenatal care

(1-sought PNC, & 0-otherwise) and skilled birth assistance (1-sought SBA, & 0-otherwise). We examined the adjusted effects of selected socioeconomic, demographic and cultural variables on the likelihood of seeking delivery care services. We also examined the effects of time dummies on the likelihood of delivery care. The regression analyses were performed separately for India and selected states on the pooled dataset of all three rounds of NFHS.

Table 5 presents the odds ratio for seeking PNC for the most recent birth to mothers, adjusted for socioeconomic, demographic and cultural characteristics in India and states during 1992-2005. Results indicate that poverty, place of residence, maternal and paternal education, parity of mother, mother's age at delivery and time dummies had statistically significant bearing on the odds for seeking PNC in India. The likelihood of seeking PNC was significantly higher among non-poor, urban mothers with primary or more education, literate husband, more than 20 years age delivery, with low parity and had sought PNC during 1998-2006. The effect of religion, caste, mass media exposure and age difference to head of household also had significant effects on the odds for PNC in India. However, the effect of caste, age difference between head of household had no significant effect on odds for PNC among mothers in Uttar Pradesh. The effect of place of residence and religion, and age difference of women to head of household had no significant effect on the likelihood for seeking PNC among mothers in Maharashtra. In case of Tamil Nadu, the effect of place of residence, maternal education, husband's education, parity, and time dummies had significant effects on the odds for seeking PNC.

Table 6 presents the effect of socioeconomic, demographic and cultural variables on the likelihood for seeking SBA in India and selected states during 1992-2005. Result indicates that poverty, place of residence, maternal education, paternal education, parity, pregnancy complication, prenatal care, mass-media exposure and time dummies had statistically significant effects on the odds for seeking SBA in India. The non-poor & urban mothers, with above primary education, literate husband, low parity, had any pregnancy complications, received prenatal care, had any mass-media exposure, and gave birth during 1998-2006 were significantly more likely to had SBA. However, the effect of poverty and religion, age difference to head of household didn't had significant bearing on likelihood for SBA among mothers from Tamil Nadu and Maharashtra.

DISCUSSION AND CONCLUSION

This paper attempted to examine the trends, patterns and correlates of economic inequalities in utilization of delivery care services in India and selected states, taking case of prenatal care and skilled birth assistance, using data from three rounds on Indian National Family Health Survey (NFHS) conducted during 1992-2005. Furthermore, the roles of source of delivery care providers with regard to skilled birth assistance were also investigated. The finding from the study revealed a sluggish increment in prenatal care and skilled birth assistance in India during 1992-2005. However, the increment were mainly noted among the non-poor mothers, and the poor mothers least benefitted from the government sponsored delivery care services over past 15 years. The increment in SBA was largely due to improvement in birth assistance at private health care providers than the public health care institutions in India and selected states. However, the only true exception to it was Tamil Nadu, where majority of SBA were conducted at public health institutions during 1992-2005, especially among the rural-poor mothers in the state.

The utilization of prenatal care and skilled birth assistance significantly varied by place of residence in India and selected states. Largest improvement in delivery care services were recorded in Tamil Nadu, followed by Maharashtra and least change was observed in Uttar Pradesh. Importantly, rural poor mothers were significantly at disadvantageous position relative to their urban non-poor counterparts. We also found large economic inequality in utilization of prenatal care and skilled birth assistance cutting across space and time in India during 1992-2005. However, inequality was more pronounced in prenatal care than skilled birth assistance. Again, the inequality prenatal care was prominent in the rural areas in India and the state of Maharashtra, while the same was high in urban areas of Uttar Pradesh and Tamil Nadu. On the other hand, inequality in utilization of skilled birth assistance was higher in rural India and states of Maharashtra & Tamil Nadu, while the same was high in the urban areas of Uttar Pradesh during 1992-2005.

The results from multivariate analyses confirmed that the utilization of delivery care services was patterned across socioeconomic status. Non-poor mothers, living in urban areas, with above primary education and literate husband, with low parity and some exposure to mass

media were more likely to receive prenatal care than their counterparts in India. Further the effect of time dummies was significant and positive, suggesting that mother who had birth during 1998-2005 were more likely to have PNC than who had births in 1992-93. We also found that the effect of economic status, maternal& paternal education, place of residence, prenatal care, pregnancy complications and mass-media exposure had significant effects on the likelihood for seeking SBA. However, the role economic factors were not found significant in Tamil Nadu and Maharashtra. Instead, the place of residence, maternal and paternal education, and mother's age at delivery were crucial predictors for SBA.

Based on the findings from the analyses, it may be argued that focus of policy and programme managers must shift from improving the average figures to the distribution of process indicators across sub-group of population which need them most. The successful example of Tamil Nadu model may be learned and replicated in other states like Uttar Pradesh, where unskilled constitute more than three fourth of all births in the state, and majority those who were seeking SBA used private health care institution during 1992-2005. This call for urgent enquiry in to the supply side variables and quality of care component of the delivery care services. Addressing the issue of equity in maternal health care, that continues to pose a formidable challenge at present, may holds key for the achievement of Millennium development goals for India in near future.

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Table 1: Socioeconomic and demographic profile of the population of Uttar Pradesh, Maharashtra, Tamil Nadu and India.

Indicators	India	Uttar Pradesh	Maharashtra	Tamil Nadu
Population (in millions) ^a	1028.6	166.2	96.0	62.0
Density of population (people/km ²) ^a	324	689	315	480
Urban population (%) ^a	27.8	20.8	42.4	44.0
Sex Ratio ^a (females/1000 males)	933	898	922	987
Decadal Growth ^a (%)	21.5	25.9	22.7	11.7
Crude Birth Rate ^b (births/1000 mid-year population)	23.1	29.5	18.1	15.8
Crude Death Rate ^b (deaths/1000 mid-year population)	7.4	8.5	6.6	7.2
Life expectancy at birth, male (in years) ^d	62.6	60.3	66	65
Life expectancy at birth, female (in years) ^d	64.2	59.5	68.4	67.4
Total Fertility Rate ^c	2.7	3.9	2.0	1.6
Infant Mortality Rate ^b (infant deaths/1000 live births)	55	69	34	35
Maternal Mortality Ratio ^b (maternal deaths/100,000 live births)	254	440	130	111
Female Literacy Rate ^a (%)	53.7	42.2	67.0	64.3
Per capita income (INR) ^e	29524	14663	41331	35134
Population below poverty line ^f (%)	27.5	32.8	30.7	22.5

^a ORGI, 2004; ^b Sample Registration System Bulletin (SRS), Vol 43, No.1, October 2008, Registrar General, Government of India, New Delhi; ^c Sample Registration System (SRS), Statistical Report 2007, Office of the Registrar General, Government of India, New Delhi; ^d SRS Abridged Life Table 2002-06, Office Registrar General of India, Ministry of Home Affairs, New Delhi; ^e Economic Survey, 2008-09, Ministry of Finance, Economic Division, Government of India, New Delhi; ^f INR- Indian national rupee, estimates of the National Sample Survey Organization (NSSO), 2004-05; ^g MMR- Special Bulletin on Maternal Mortality in India-2004-06, SRS, Office of Registrar General, India, Vital Statistics Division, New Delhi.

Table 2: Trends in prenatal care (in 1st trimester & 3+ ANC visits) and skilled birth assistance (natal care) among poor and non-poor mothers across selected states, India, 1992-2005

Indicators	Rural			Urban			Total		
	Poor	Non-poor	Total	Poor	Non-poor	Total	Poor	Non-poor	Total
Skilled Birth Attended (%)									
India									
1992-93	16.0	34.7	26.8	36.1	70.1	67.6	17.1	46.4	36.2
1998-99	16.5	43.1	34.1	36.8	74.9	73.8	16.9	52.1	42.9
2005-06	18.4	48.5	40.2	31.4	77.8	76.5	18.9	57.8	49.5
Uttar Pradesh									
1992-93	8.0	16.5	12.4	28.1	45.8	44.8	8.4	24.2	17.8
1998-99	8.6	22.5	17.0	24.2	53.6	52.3	8.8	29.3	22.7
2005-06	13.5	27.5	23.1	15.6	52.2	51.2	13.6	34.1	28.8
Maharashtra									
1992-93	27.5	53.3	39.0	43.6	83.3	80.7	28.0	70.3	55.2
1998-99	21.8	57.1	43.9	30.3	85.6	84.6	23.7	71.8	59.7
2005-06	39.7	69.4	58.2	35.5	90.8	88.4	40.2	82.2	72.2
Tamil Nadu									
1992-93	51.4	70.6	61.8	80.4	94.8	93.0	54.7	82.8	73.0
1998-99	64.4	83.4	78.2	70.0	97.2	95.0	63.9	89.4	84.0
2005-06	78.2	93.4	90.0	95.5	97.5	97.3	83.0	95.4	93.3
Prenatal care (1st trimester & 3+ ANC visits, in %)									
	Rural			Urban			Total		
India									
1992-93	9.2	23.0	16.7	10.9	40.4	38.2	9.1	28.5	21.6
1998-99	9.0	27.1	20.9	11.3	51.3	50.0	9.1	33.9	27.3
2005-06	11.3	34.9	28.3	17.8	59.2	58.0	11.5	42.7	36.0
Uttar Pradesh									
1992-93	3.5	8.9	6.2	3.9	23.7	22.5	3.6	12.7	9.0
1998-99	3.4	7.5	5.9	0.0	27.4	26.1	3.1	12.1	9.2
2005-06	5.7	15.0	12.0	15.8	29.7	29.3	6.0	18.9	15.5
Maharashtra									
1992-93	14.5	29.2	21.0	15.6	35.9	34.6	14.0	33.2	26.3
1998-99	14.8	43.0	32.6	37.7	54.0	53.7	16.1	49.1	40.8
2005-06	31.1	59.1	48.9	13.4	69.0	66.7	31.4	65.0	57.3
Tamil Nadu									
1992-93	25.6	45.6	36.5	25.0	56.1	52.6	25.2	51.2	42.3
1998-99	39.0	56.4	51.6	32.4	74.4	70.9	39.5	63.4	58.2
2005-06	58.0	74.3	70.5	39.9	83.8	80.3	55.9	78.7	75.0

Table 3a: Trends in inequality in skilled birth assistance (natal care) among poor and non-poor mothers across selected states, India, 1992-2005

Indicators	Rural			Urban			Total		
	NP:P ratio	CI	(SE)	NP:P ratio	CI	(SE)	NP:P ratio	CI	(SE)
Safe delivery (medical assistance at delivery)									
India									
1992-93	2.2	0.26	0.005	1.9	0.14	0.004	2.7	0.31	0.004
1998-99	2.6	0.27	0.005	2.0	0.12	0.004	3.1	0.30	0.003
2005-06	2.6	0.25	0.004	2.5	0.12	0.004	3.1	0.27	0.003
Uttar Pradesh									
1992-93	2.1	0.24	0.021	1.6	0.26	0.018	2.9	0.38	0.015
1998-99	2.6	0.24	0.024	2.2	0.22	0.024	3.3	0.34	0.018
2005-06	2.0	0.24	0.017	3.3	0.26	0.018	2.5	0.32	0.013
Maharashtra									
1992-93	1.9	0.20	0.022	1.9	0.10	0.012	2.5	0.25	0.013
1998-99	2.6	0.27	0.018	2.8	0.06	0.009	3.0	0.25	0.011
2005-06	1.7	0.17	0.014	2.6	0.07	0.008	2.0	0.17	0.009
Tamil Nadu									
1992-93	1.4	0.12	0.015	1.2	0.04	0.008	1.5	0.14	0.010
1998-99	1.3	0.08	0.010	1.4	0.03	0.008	1.4	0.08	0.007
2005-06	1.2	0.05	0.008	1.0	0.01	0.005	1.1	0.03	0.005

Table 3b: Trends in inequality in pre-natal care among poor and non-poor mothers across selected states, India, 1992-2005

Indicators	Rural			Urban			Total		
	NP:P ratio	CI	(SE)	NP:P ratio	CI	(SE)	NP:P ratio	CI	(SE)
1st Semester & 3+ ANC visits									
India									
1992-93	2.5	0.29	0.008	3.7	0.23	0.008	3.1	0.35	0.006
1998-99	3.0	0.34	0.007	4.5	0.27	0.006	3.7	0.37	0.005
2005-06	3.1	0.31	0.006	3.3	0.17	0.006	3.7	0.33	0.005
Uttar Pradesh									
1992-93	2.6	0.29	0.033	6.1	0.40	0.026	3.6	0.44	0.024
1998-99	2.2	0.32	0.050	n.a.	0.38	0.026	4.0	0.48	0.033
2005-06	2.6	0.29	0.028	1.9	0.34	0.030	3.2	0.37	0.021
Maharashtra									
1992-93	2.0	0.25	0.036	2.3	0.24	0.030	2.4	0.28	0.024
1998-99	2.9	0.29	0.024	1.4	0.16	0.016	3.1	0.27	0.016
2005-06	1.9	0.20	0.018	5.1	0.14	0.015	2.1	0.19	0.012
Tamil Nadu									
1992-93	1.8	0.18	0.027	2.2	0.16	0.025	2.0	0.21	0.019
1998-99	1.4	0.14	0.019	2.3	0.11	0.016	1.6	0.16	0.014
2005-06	1.3	0.09	0.016	2.1	0.10	0.015	1.4	0.10	0.011

Table 4: Percentage of birth assisted by skilled health professionals among poor and non-poor mothers by place of residence across selected states, India, 1992-2005

Time/Indicator	Unskilled home delivery			Skilled home delivery			Delivery at Public institution			Delivery at Private institution		
	Poor	Non-poor	Total	Poor	Non-poor	Total	Poor	Non-poor	Total	Poor	Non-poor	Total
India (Total)												
1992-93	82.9	53.6	63.8	7.8	10.2	9.4	7.5	19.1	15.0	1.9	17.2	11.8
1998-99	83.2	47.9	57.1	6.0	9.9	8.9	6.8	19.7	16.3	4.1	22.5	17.7
2005-06	81.1	42.3	50.5	7.0	8.8	8.4	6.7	22.5	19.1	5.2	26.5	22.0
Uttar Pradesh (Total)												
1992-93	91.7	75.8	82.2	4.1	7.2	6.0	3.3	9.6	7.1	1.0	7.4	4.8
1998-99	89.8	70.2	76.3	3.9	9.3	7.6	3.4	10.4	8.2	3.0	10.1	7.9
2005-06	86.4	65.9	71.2	4.1	8.4	7.3	4.1	7.8	6.9	5.4	17.9	14.7
Maharashtra (Total)												
1992-93	72.0	29.8	44.8	10.6	9.5	9.9	12.7	28.3	22.7	4.7	32.4	22.5
1998-99	76.3	28.2	40.3	6.9	6.8	6.9	9.1	29.4	24.3	7.7	35.6	28.6
2005-06	59.8	17.8	27.8	6.6	4.3	4.8	17.3	30.2	27.1	16.2	47.7	40.2
Tamil Nadu (Total)												
1992-93	45.3	17.2	27.0	11.0	6.6	8.2	33.4	34.3	34.0	10.3	41.9	30.8
1998-99	34.2	11.7	16.0	6.9	3.8	4.4	41.3	37.3	38.0	17.6	47.3	41.6
2005-06	17.0	4.6	6.7	4.0	2.5	2.8	60.0	49.3	51.1	19.1	43.6	39.4
India (Rural)												
1992-93	84.0	64.3	73.2	7.7	11.4	9.7	6.4	13.8	10.5	1.9	10.6	6.6
1998-99	83.6	56.9	65.9	6.0	10.6	9.0	6.6	15.7	12.7	3.9	16.8	12.4
2005-06	81.6	51.5	59.8	7.0	10.0	9.2	6.4	18.8	15.4	5.1	19.7	15.7
Uttar Pradesh (Rural)												
1992-93	92.0	83.5	87.6	3.8	6.3	5.1	3.1	7.0	5.1	1.1	3.1	2.2
1998-99	90.2	76.9	82.0	3.7	7.6	6.1	3.4	8.7	6.7	2.7	6.9	5.3
2005-06	86.5	72.5	76.9	4.1	7.3	6.3	4.2	7.5	6.4	5.3	12.7	10.4
Maharashtra (Rural)												
1992-93	72.5	46.7	61.0	11.4	15.6	13.3	10.8	19.5	14.7	5.3	18.3	11.1
1998-99	78.2	42.9	56.1	6.6	10.8	9.2	7.8	21.5	16.4	7.4	24.8	18.3
2005-06	60.3	30.7	41.8	7.8	4.9	6.0	17.2	24.7	21.9	14.7	39.7	30.3
Tamil Nadu (Rural)												
1992-93	48.6	29.4	38.2	11.9	11.1	11.5	29.4	27.8	28.5	10.0	31.8	21.8
1998-99	35.7	16.7	21.8	6.1	5.1	5.3	39.7	32.9	34.7	18.6	45.4	38.1
2005-06	21.8	6.6	10.0	5.5	3.4	3.9	57.3	49.3	51.1	15.5	40.6	35.0
India (Urban)												
1992-93	63.9	29.9	32.5	7.7	8.3	8.2	25.4	30.5	30.1	3.0	31.3	29.2
1998-99	63.2	25.1	26.2	9.4	8.3	8.3	15.7	29.6	29.2	11.7	37.1	36.3
2005-06	68.6	22.2	23.5	7.2	6.2	6.3	15.2	30.4	30.0	9.0	41.2	40.3
Uttar Pradesh (Urban)												
1992-93	71.9	54.2	55.2	14.5	9.8	10.1	13.6	17.0	16.8	0.0	19.0	17.9
1998-99	75.5	46.0	47.3	4.9	15.7	15.2	6.3	16.5	16.1	13.4	21.9	21.5
2005-06	84.4	47.8	48.8	5.2	11.3	11.2	0.0	8.8	8.5	10.4	32.1	31.5
Maharashtra (Urban)												
1992-93	56.4	16.7	19.4	5.1	4.6	4.6	38.6	35.2	35.5	0.0	43.5	40.6
1998-99	69.7	14.4	15.4	9.8	3.0	3.2	0.0	37.4	36.7	20.4	45.2	44.8
2005-06	64.5	9.2	11.6	0.4	3.6	3.5	11.7	34.2	33.2	23.5	53.0	51.8
Tamil Nadu (Urban)												
1992-93	19.6	5.2	7.0	5.4	1.8	2.3	66.1	40.5	43.8	8.9	52.5	46.9
1998-99	30.0	2.8	5.0	12.0	1.7	2.5	52.0	43.6	44.3	6.0	51.9	48.2
2005-06	4.5	2.5	2.7	0.0	1.5	1.4	64.1	49.7	51.1	31.4	46.2	44.8

Table 5: Adjusted odds ratio showing the likelihood for seeking prenatal care[‡] for most recent birth to mothers by selected socioeconomic and demographic characteristics across states, India, 1992-200[†]

Covariates	India		Uttar Pradesh		Maharashtra		Tamil Nadu	
	Odds Ratio	P-values	Odds Ratio	P-values	Odds Ratio	P-values	Odds Ratio	P-values
Place of residence								
Urban [®]	1		1		1		1	
Rural	0.62	0.000	0.43	0.000	0.884	0.156	0.71	0.000
Maternal education								
No education [®]	1		1		1		1	
Primary	1.63	0.000	1.46	0.001	1.090	0.470	1.12	0.348
Secondary	2.89	0.000	2.27	0.000	1.716	0.000	1.64	0.000
Higher	6.69	0.000	5.63	0.000	4.418	0.000	3.57	0.000
Paternal education								
No education [®]	1		1		1		1	
Primary	1.21	0.000	1.17	0.257	1.078	0.594	1.05	0.697
Secondary	1.26	0.000	1.69	0.000	1.599	0.000	1.25	0.098
Higher	1.48	0.000	2.35	0.000	2.426	0.000	1.52	0.030
Mother's age at delivery								
<20y [®]	1		1		1		1	
20-29y	1.37	0.000	1.50	0.001	1.380	0.002	1.39	0.011
30+y	1.67	0.000	1.69	0.001	1.747	0.001	1.30	0.169
Parity								
1 [®]	1		1		1		1	
2-3	0.62	0.000	0.57	0.000	0.598	0.000	0.58	0.000
4+	0.34	0.000	0.47	0.000	0.394	0.000	0.24	0.000
Religion								
Hindu [®]	1		1		1		1	
Muslim	1.13	0.000	1.18	0.092	1.084	0.439	0.91	0.609
Other	0.88	0.000	2.09	0.026	1.200	0.155	0.87	0.410
Caste group								
SC/ST [®]	1		1		1		1	
OBC	1.24	0.000	0.99	0.906	1.671	0.000	1.15	0.219
General	1.36	0.000	1.16	0.180	1.575	0.000	1.06	0.738
Mass media exposure								
No [®]	1		1		1		1	
Yes	1.84	0.000	1.47	0.000	1.523	0.000	1.21	0.107
Age difference to HH head								
<20y	1		1		1		1	
>=20y	0.94	0.001	1.09	0.268	0.944	0.451	1.08	0.401
Poverty status								
Non-poor [®]	1		1		1		1	
Poor	0.59	0.000	0.58	0.049	0.629	0.016	0.91	0.638
Time dummies								
1992-93 [®]	1		1		1		1	
1998-99	1.05	0.522	0.79	0.436	1.525	0.041	1.65	0.036
2005-06	1.46	0.000	1.92	0.003	2.196	0.000	3.08	0.000
<i>Number of observation</i>	78391		9489		4189		3015	
<i>Log likelihood</i>	-38352.6		-2812.9		-2324.9		-1703.4	
<i>Pseudo R2</i>	0.216		0.236		0.193		0.163	

Abbreviations: [‡]-Dependent variable is “prenatal care in first trimester & completion of 3+ ANC visits” that takes a value of 1 if yes and 0 for otherwise; [†]-Based on pooled dataset for all three rounds of NFHS; [®] - Reference category.

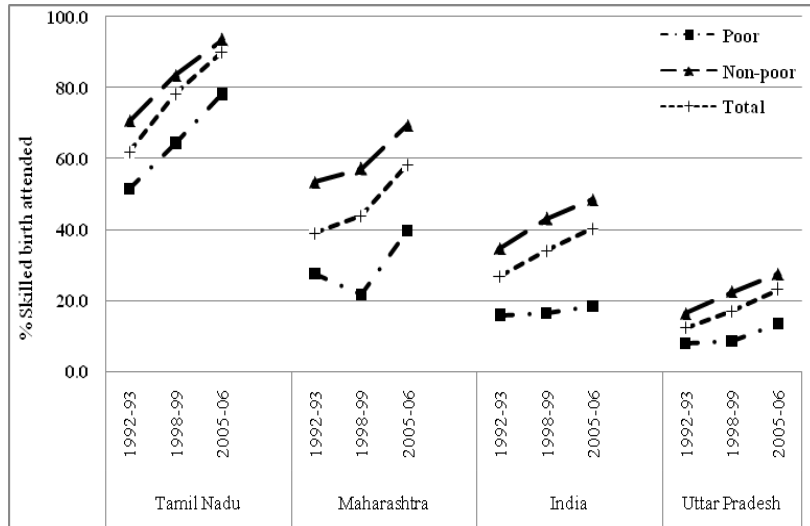
Table 6: Adjusted odds ratio showing the likelihood for skilled birth assistance⁶ to mothers by selected socioeconomic and demographic characteristics across states, India, 1992-2006[†]

Covariates	India		Uttar Pradesh		Maharashtra		Tamil Nadu	
	Odds Ratio	P-values	Odds Ratio	P-values	Odds Ratio	P-values	Odds Ratio	P-values
Place of residence								
Urban [@]	1		1		1		1	
Rural	0.36	0.000	0.40	0.000	0.28	0.000	0.23	0.000
Maternal education								
No education [@]	1		1		1		1	
Primary	1.68	0.000	1.26	0.007	1.54	0.000	1.56	0.001
Secondary	2.63	0.000	1.88	0.000	2.37	0.000	2.91	0.000
Higher	6.88	0.000	5.33	0.000	5.87	0.000	5.29	0.002
Paternal education								
No education [@]	1		1		1		1	
Primary	1.21	0.000	1.35	0.001	1.44	0.003	1.16	0.278
Secondary	1.21	0.000	1.44	0.000	1.88	0.000	1.43	0.022
Higher	1.40	0.000	2.06	0.000	2.19	0.000	2.52	0.005
Mother's age at delivery								
<20y [@]	1		1		1		1	
20-29y	1.16	0.000	1.00	0.959	1.40	0.001	1.29	0.096
30+y	1.46	0.000	1.20	0.110	2.13	0.000	1.93	0.007
Parity								
1 [@]	1		1		1		1	
2-3	0.60	0.000	0.57	0.000	0.75	0.004	0.57	0.000
4+	0.39	0.000	0.50	0.000	0.63	0.002	0.48	0.001
Religion								
Hindu [@]	1		1		1		1	
Muslim	0.79	0.000	0.76	0.000	1.03	0.806	1.10	0.744
Other	1.04	0.133	3.51	0.000	1.48	0.009	1.18	0.547
Caste group								
SC/ST [@]	1		1		1		1	
OBC	1.29	0.000	1.26	0.006	1.03	0.816	1.56	0.007
General	1.43	0.000	1.60	0.000	1.28	0.034	1.30	0.131
Pregnancy complication								
No complication [@]	1		1		1		1	
Any complication	1.24	0.000	1.50	0.000	1.63	0.000	1.86	0.001
Prenatal care								
No [@]	1		1		1		1	
Yes	2.92	0.000	2.59	0.000	2.15	0.000	1.46	0.001
Mass media exposure								
No [@]	1		1		1		1	
Yes	1.48	0.000	1.34	0.000	1.42	0.000	1.26	0.069
Age difference to HH head								
<20y [@]	1		1		1		1	
>=20y	1.02	0.244	1.07	0.267	1.32	0.001	1.17	0.229
Poverty status								
Non-poor [@]	1		1		1		1	
Poor	0.58	0.000	0.64	0.019	0.90	0.516	1.01	0.959
Time dummies								
1992-93 [@]	1		1		1		1	
1998-99	1.14	0.040	1.27	0.122	0.78	0.187	2.38	0.002
2005-06	1.14	0.026	1.49	0.054	0.95	0.808	2.29	0.011
<i>Number of observation</i>	85505		10322		4612		3302	
<i>Log likelihood</i>	-42461.0		-4365.0		-2042.7		-1077.5	
<i>Pseudo R2</i>	0.279		0.230		0.302		0.276	

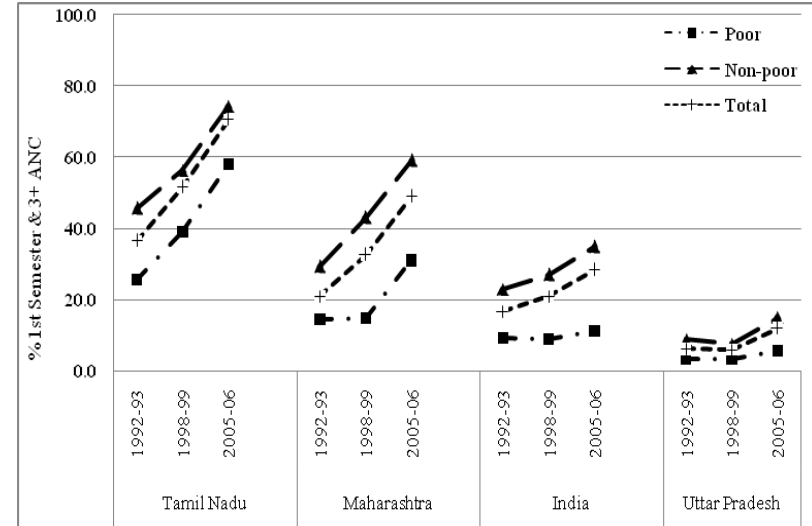
Abbreviation: ⁶ Dependent variable is "Skilled birth assistance" that takes a value of 1 if yes and 0 if otherwise; [†] Based on pooled dataset for three rounds for NFHS; [@]- Reference category.

Figure 1: Trends in prenatal care (initiated in 1st trimester and had 3+ ANC visits) and birth assisted by skilled health professionals among poor and non-poor mother across states, India, 1992-2005

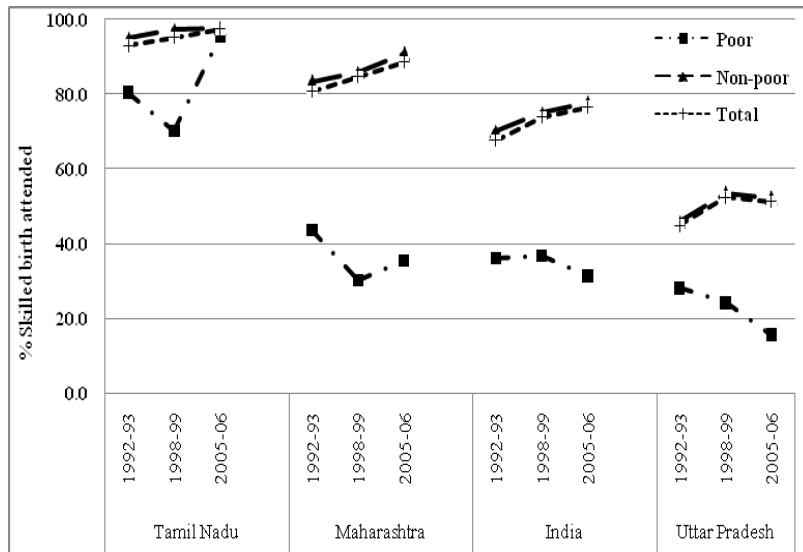
(a) % Skilled birth attended- Rural



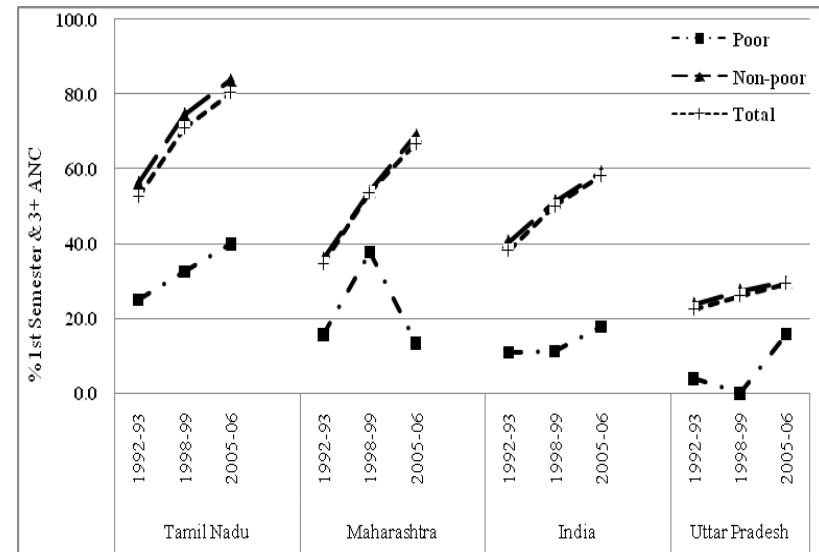
(b) % Prenatal care (initiated in 1st trimester & 3+ ANC visits)-Rural



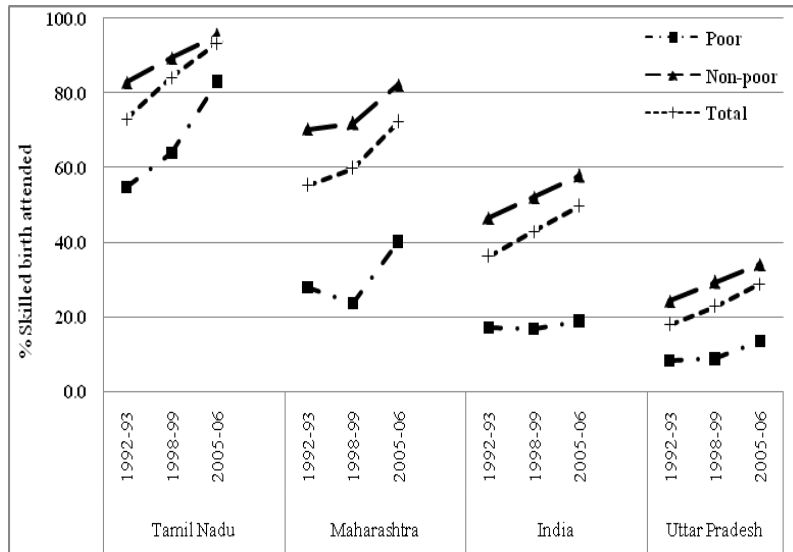
(c) % Skilled birth attended- Urban



(d) % Prenatal care (initiated in 1st trimester & 3+ ANC visits)-Urban



(e) % Skilled birth attended- Total



(f) % prenatal care (initiated in 1st trimester & 3+ ANC visits)-Total

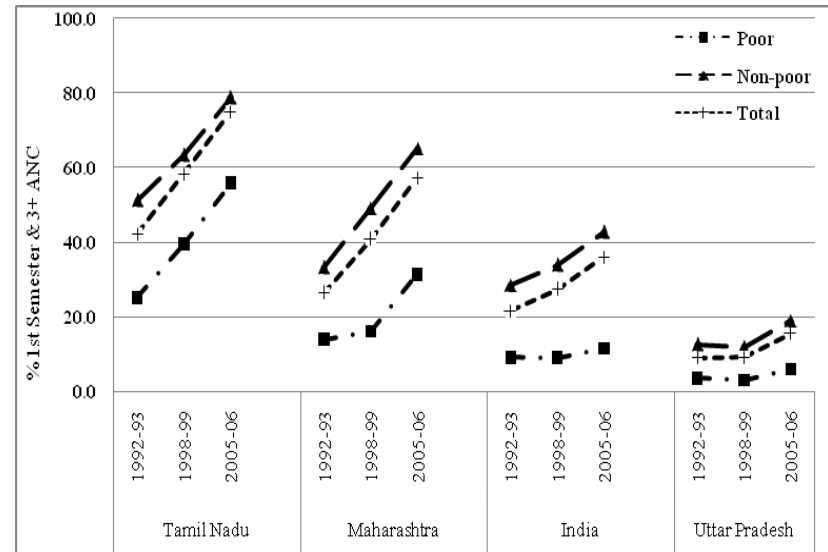
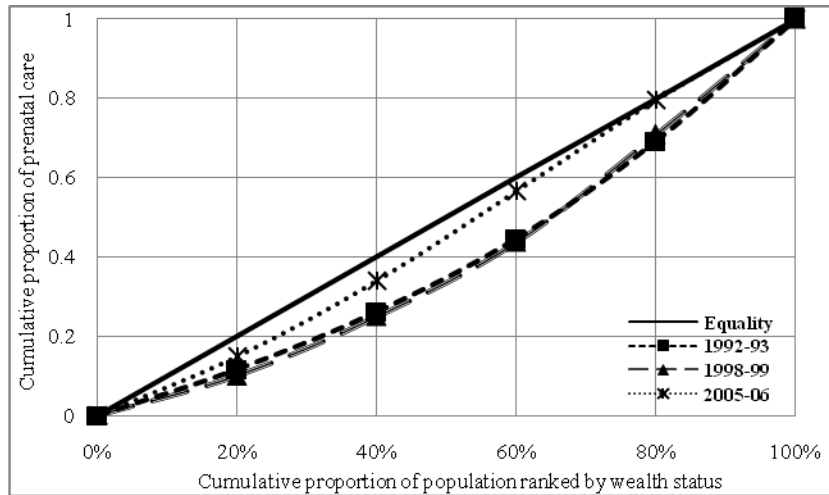
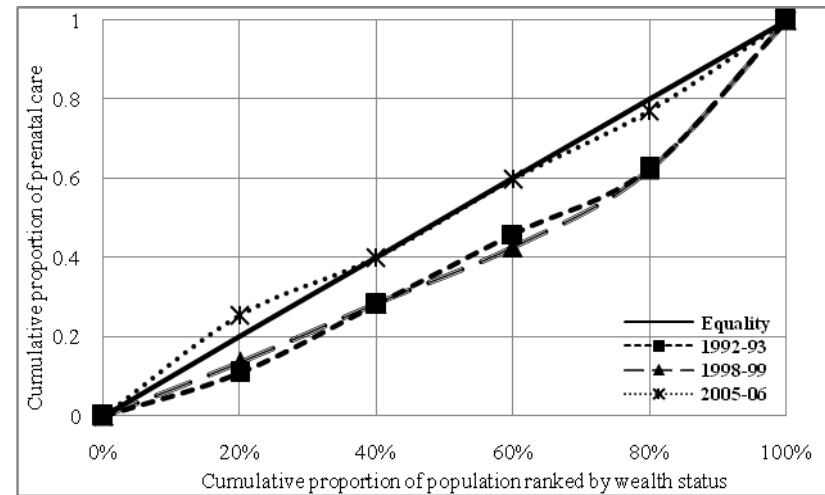


Figure 2 a: Concentration curves showing inequalities in prenatal care by wealth status of population across states, India, 1992-2005

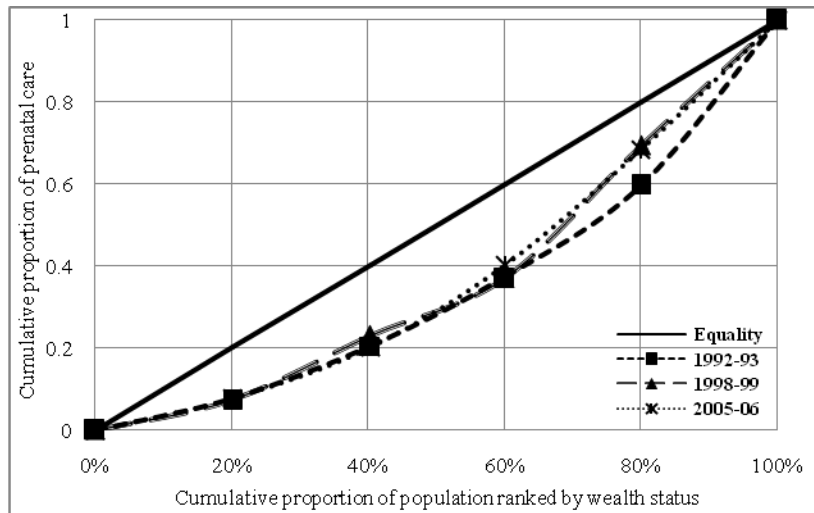
(a) Prenatal care -India



(b) Prenatal care - Uttar Pradesh



(c) Prenatal care -Maharashtra



(d) Prenatal care -Tamil Nadu

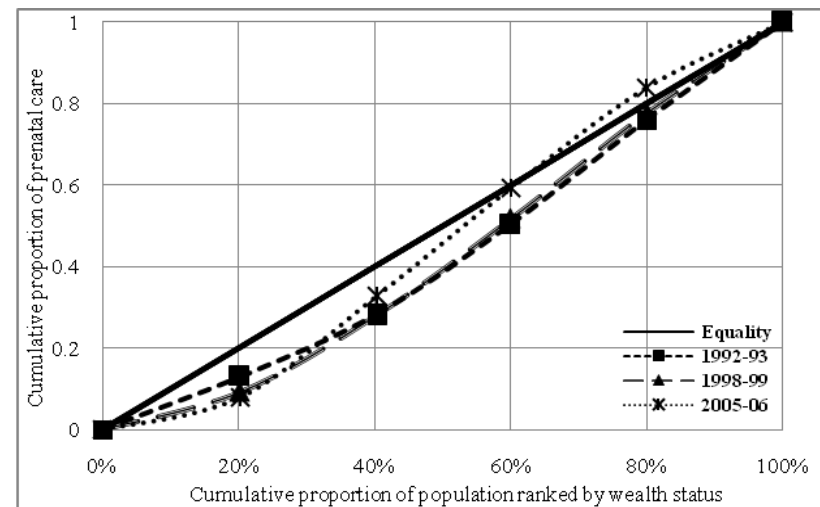
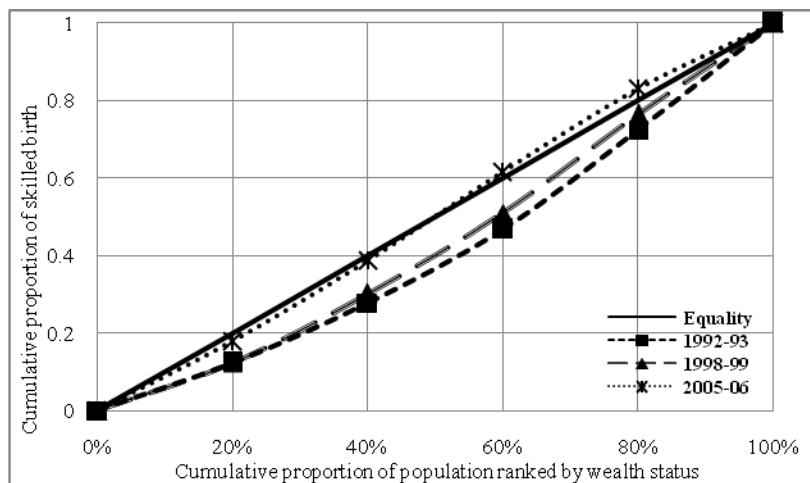
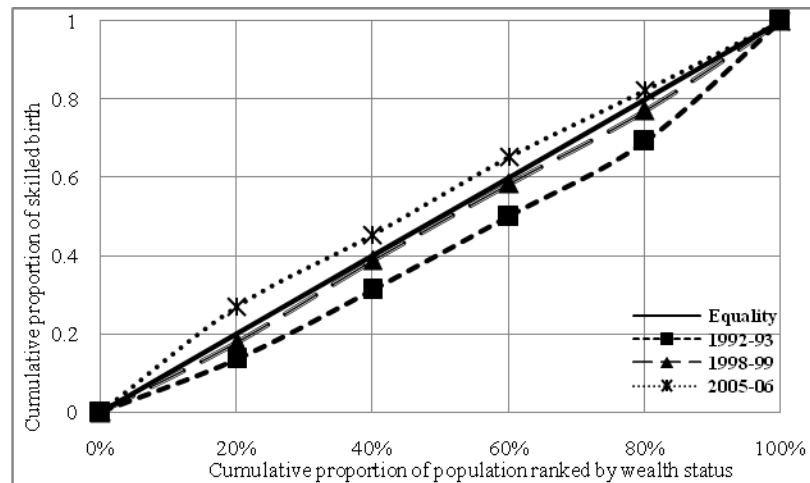


Figure 2 b: Concentration curves showing inequalities in skilled birth attended (natal care) by wealth status of population across states, India, 1992-2005

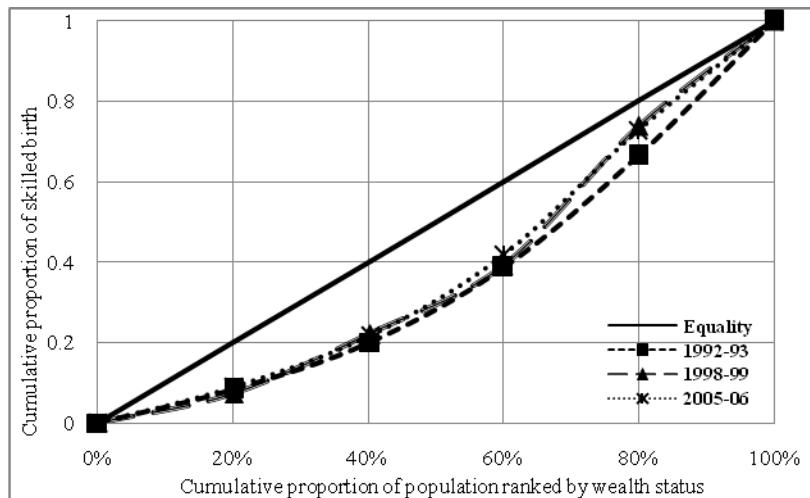
(a) Natal care (SBA) -India



(b) Natal care (SBA)- Uttar Pradesh



(c) Natal care -Maharashtra



(d) Natal care – Tamil Nadu

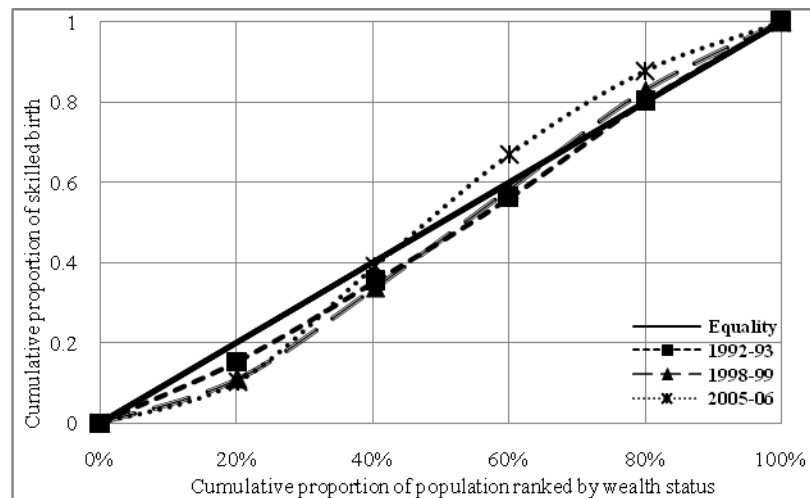
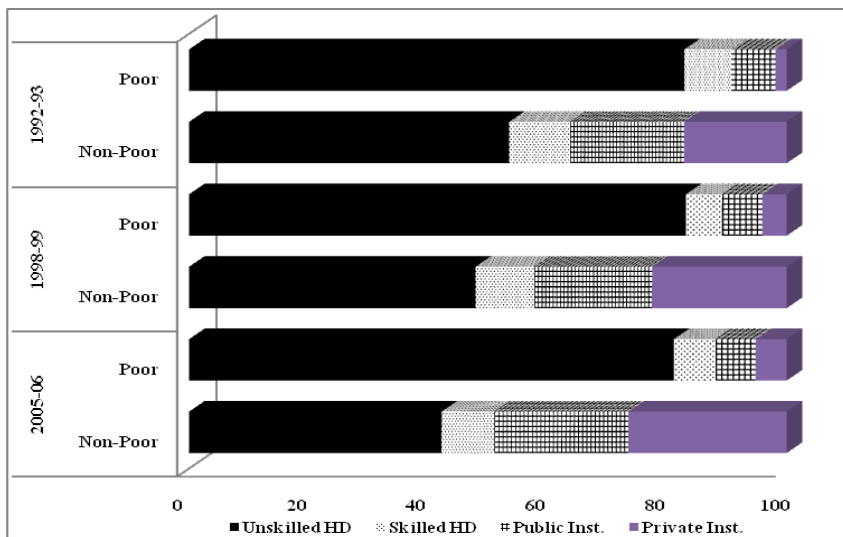
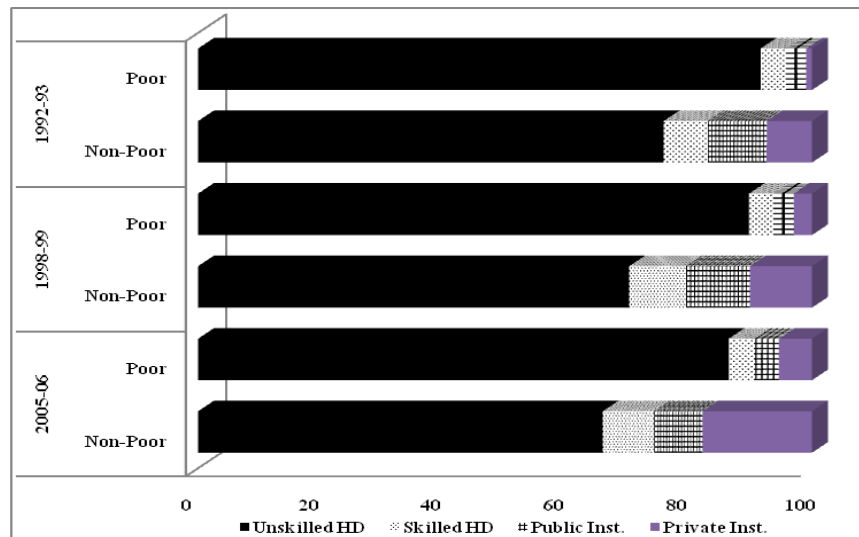


Figure 3: Percent distribution of births delivered by source of providers among poor and non-poor mothers across states, India, 1992-2005

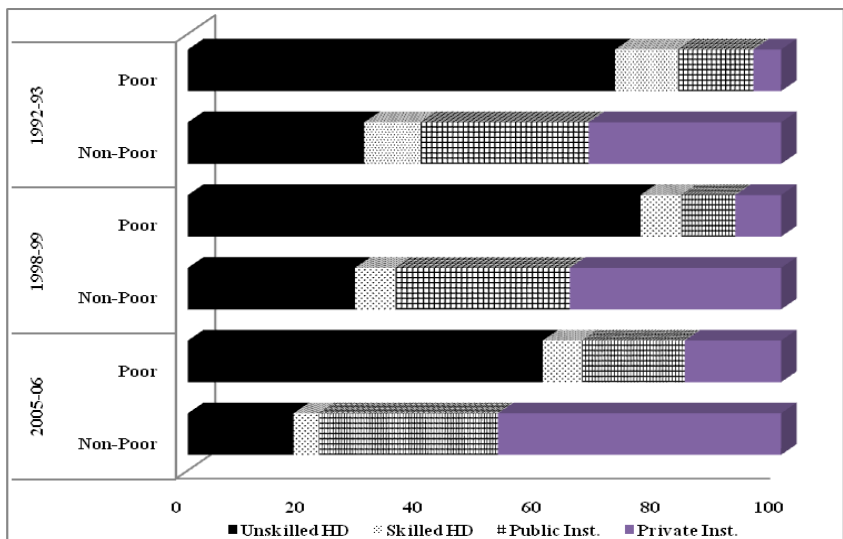
(a) India



(b) Uttar Pradesh



(c) Maharashtra



(d) Tamil Nadu

