Differentials in the quality of antenatal care in India

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Abstract

Objective. To investigate the socio-economic differentials in the quality (clinical and interpersonal) of antenatal care and also the correlation between differentials in the quality and utilization of antenatal care.

Design. The study uses cross-sectional, nationally representative data from National Family Health Survey (1998–99).

Setting. Four south Indian states (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) and four north Indian states (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh).

Main outcomes measured. More than four antenatal care visits for utilization, and index of clinical, information and interpersonal quality of care.

Results. Lower than desired quality of antenatal care was observed in both north and south Indian states, though the quality was significantly better in south India compared with north India, especially among the disadvantaged women. Significant socio-economic differentials in the quality of care were evident in both north and south India, but were more glaring in north India. A significantly positive relationship was observed between the quality and utilization of antenatal care in the rural areas from village-level multivariate analysis.

Discussion. Poor quality of antenatal care is likely to reduce its utilization. Policy and program interventions to improve the quality of care of antenatal care, especially for the poor and other disadvantaged population groups, more so in north India, are essential to improve maternal health outcomes. The India's National Rural Health Mission (NRHM), launched in 2005, should lay greater emphasis on improving the quality of antenatal care, among other things, to increase utilization of antenatal care and achieve better maternal health outcomes.

Keywords: India, antenatal care, quality of services, interpersonal care, inequities

Introduction

Antenatal care is the 'care before birth' to promote the well-being of mother and fetus, and is essential to reduce maternal morbidity and mortality, low-weight births and perinatal mortality [1–2]. However, the content and quality of antenatal care and the availability of effective referral and essential obstetric care are important for antenatal care to be effective [2].

Although utilization of antenatal care (proportion of pregnant women receiving one or more consultations with trained health workers) is regularly monitored in most settings, and has improved considerably in developing countries in 1990s, there is little evidence on the content and quality of antenatal care in these settings [3]. In fact, the weak relationship, observed in some studies, between antenatal care utilization and maternal health outcomes may be partly due to failure to take into account the content and quality of antenatal care provided [4–5].

In addition, there is very sparse evidence on socio-economic differentials in the quality of antenatal care in developing countries [6]. Most of the studies in India [7–10] and in other developing countries [11–13] have attributed socio-economic differentials in antenatal care utilization to a combination of poor access to health services, low education levels and poor demand. Few studies examined the socio-economic differentials in the quality of antenatal care and its association with utilization. Some studies, however, have suggested poor quality, unfriendly treatment and less information sharing by health providers to the poor and disadvantaged women [14–16]. These studies also suggested that the perception of poor quality of care may lead to under-utilization of health services by the poor women.

Drawing upon a nationally representative survey data from India, the study investigates: (i) quality of antenatal care and socio-economic differentials in the content and self-reported technical and interpersonal quality of antenatal care in four north Indian and four south Indian states; and (ii) correlation

between quality of antenatal care and utilization of antenatal care services.

Methods

The data from the National Family Health Survey-2 (NFHS-2), implemented nationwide between November 1998 and December 1999, were used in this study. NFHS-2 is a nationally representative, cross-sectional survey using a systematic, two-stage, cluster sample of households [17]. A 3-year retrospective pregnancy history was obtained from married women, aged 15–49 years, who gave birth in the 3 years preceding the survey. However, to reduce recall bias, the sub-sample for this study is limited to only those who gave births in the 6 months preceding the survey. The analysis focused on the four north and four south Indian states to provide a comparative perspective, as two regions differ substantially in utilization of preventive health services. These criteria yielded a final sub-sample of 840 women from the four south Indian states (Andhra Pradesh, Karnataka, Kerala and Tamil Nadu) and 2970 women from the four north Indian states (Bihar, Madhya Pradesh, Rajasthan and Uttar Pradesh).

Dependent variables

Utilization of antenatal care. Utilization of antenatal care is measured as at least one antenatal consultation with a trained provider (doctor/nurse); at least four antenatal consultations; and whether the women initiated antenatal consultation in the first trimester.

Clinical quality. Three different aspects of quality of care are generally assessed: structure, process and outcome [18–19]. The 'clinical quality' of antenatal care was measured by ever performance of essential physical examinations, tests and services by the provider (measurement of weight, height, blood pressure; urine and blood testing; abdomen examination; provision of iron/folic acid supplementation and tetanus toxoid immunization; and provision of information on nutrition, danger signs of pregnancy, delivery care, newborn care and family planning). Two separate summative indexes were created to measure the overall level of quality of 'clinical care' and the quality of 'information provided', both ranging from 0 to 5. The data on quality of clinical care are available by the type of provider (doctor and nurse) but not by the affiliation of the providers (i.e. public or private sector).

Interpersonal quality of care. The 'interpersonal' quality of care was assessed by whether the provider spent enough time with the client; spoke nicely to the woman; and respected the need for client's privacy. The data on interpersonal quality of care were available by the type of facility visited (public and private).

Independent variables

Wealth quintiles (based on household wealth index), caste and educational status were the main socio-economic status indicators to examine the socio-economic differentials in the utilization and the quality of antenatal care.

Statistical methods

Bivariate analysis is used to examine the socio-economic differentials in the utilization and the quality of antenatal care. Pearson's chi-square test is used to test the significance of differences in the dependent variable across two categories. The two sample mean test is used to test the statistical significance of difference in means of quality of care indexes across two categories.

Two multivariate linear regression models were used to examine the adjusted relationships: (i) the first model used summative quality of care indexes as dependent variable to calculate the adjusted relationship of quality of antenatal care with various socio-economic variables; and (ii) the second was fitted with the proportion of women in a village seeking four or more antenatal visits as the dependent variable to examine the independent relationship of the quality of care with antenatal care utilization after controlling for access to health services and other state level variables. (Since the quality of antenatal care data is available only for women who utilized antenatal care, the only way to examine this relationship was to do a village-level analysis. Urban areas are excluded from the second regression, as the access is assumed to be universal in urban areas.)

All the point estimates were weighted to provide representative estimates. In addition, the standard errors were adjusted for the clustered multistage sampling design (Huber-white standard error estimates) to give efficient confidence intervals. The statistical analysis was carried using the Stata 8.0 statistical software [20].

Results

Differentials in antenatal care utilization

The women in south India utilized antenatal care significantly more than those in the north India for all the utilization indicators, with sharpest differences observed for 'four or more antenatal visits' (Table 1). The differences in the utilization between north and south were significantly wider in the disadvantaged social groups than among the better-off for all the three indicators. For instance, while the gap between North and South in the poor population quintile for at least one antenatal care visit was 56% (82% in the North versus 26% in the South), it was only 13.8% in the wealthiest population quintile (Table 1). The socio-economic differentials within each region and between the North and the South were even more acute for 'four or more antenatal care consultations'. Similar differences were observed by caste and education. In addition, majority of women, especially in the South, chose doctors than nurses as providers of antenatal care.

Differentials in the quality of clinical care

North–South differentials. Only 40% of the women who received antenatal care in the North compared with 87% in

Table 1 Differentials in antenatal care utilization rates by socio-economic characteristics of women who had birth in the last 6 months of the survey

Background characteristic of the woman	Antenatal care utilization by any trained provider (%)		Antenatal care utilization: doctors (%)		Antenatal care utilization: nurse (%)		4+ Antenatal care visits (%)		Antenatal care visit in the first trimester (%)	
	North	South	North	South	North	South	North	South	North	South
Overall	43.1	93.4	26.1	82.3	14.1	27.1	9.6	69.6	17.1	59.3
Household Wealth										
Poorest 20%	26.3	82.2	13.1	62.3	8.6	31.0 [NS]	2.8	47.5	7.3	33.6
Second poorest	36.2	89.6	18.6	76.9	13.3	23.6	3.5	55.5	10.7	48.0
Middle	45.1	96.2	27.2	81.6	14.2	30.0	5.4	69.1	16.7	55.7
Second richest	57.2	98.9	37.8	95.1	20.6	29.5	16.5	84.7	24.7	74.2
Richest	86.2	100.0	66.4	97.4	22.4	16.5	45.5	95.9	53.4	92.5
Caste										
Scheduled caste	37.8	94.6	18.4	74.1	16.5 [NS]	33.7	4.4	59.9	10.5	48.1
Scheduled tribe	41.0	61.9	18.9	44.6	12.2	15.7	5.5	35.9	14.2	37.4
Other backward	41.0	95.3	25.9	86.1	12.5	33.2	9.2	72.2	16.2	62.6
General	49.4	94.2	34.2	88.1	14.5	11.9	15.1	78.3	23.5	66.4
Education										
No education	34.0	83.0	18.0	67.4	11.6	23.0	4.3	50.0	10.5	40.0
Primary	56.0	98.4	34.0	87.1	21.5	37.7	11.6	65.3	19.9	54.2
Secondary or higher	73.0	99.2	55.9	91.7	19.9	26.3	31.1	85.7	43.7	75.3
Residence										
Rural	37.7	91.5	21.3	79.3	12.8	28.0 [NS]	6.1	64.9	13.3	54.3
Urban	73.9	98.9	54.3	915	219	24.6	29.6	83.5	38.7	74.2

Differences across all the background characteristics are statistically significant at $P < 0.05$ except where indicated; NS, not significant.

the South reported their blood pressure being measured during antenatal visit (Table 2). Less than one-third of the women in the North reported their weight being measured in at least one of the visits compared with 80% in the South. Similar differentials were observed for other components of care also—blood examination (40 versus 79%) and urine examination (38 versus 77%). The overall summative index of clinical quality on a scale of 0–5 varied significantly from 2.1 in the North to 4.1 in the South (Table 2). Major deficiencies were observed in the provision of essential information in both South and North but more so in the later. Only 23% of the women in the North and 44% of women in the South reported receiving information on danger signs during pregnancy and delivery care. The overall index of information provided on a scale of 0–5 varied from 1.5 in north India to 2.7 in south India. Besides the poor clinical and information quality, women in the North were also significantly less likely to receive iron and folic acid supplementation than their counterparts in the South (60 versus 91%), though the differences for the tetanus toxoid vaccination were not significant (89 versus 95%).

Differentials by provider (doctor/nurse). In general, women who consulted a nurse reported significantly lower level of clinical quality than those who consulted a doctor, differences being significantly larger in north India (Table 2). The overall index of clinical quality of care varied from 1.3 for a nurse to 2.5 for a doctor in north India and from 2.5 for a nurse to 4.4 for a doctor in south India (Table 2). Nurses were likely to provide significantly lower levels of information than doctors in the North (the index of information given is 1.0 versus 1.7), the differences were not significant in the South (the index of information given is 2.5 versus 2.5).

Differentials by socio-economic indicators. Significant differentials were observed in the clinical and information quality by the household wealth, caste, education and residence in both north and south India. However, the differentials were much wider in the north than in south India for some of the indicators (e.g. the richest/poorest difference in clinical quality of care was 1.8 in North compared with 1.1 in South).

The North–South differentials in the quality of care were observed in all the population groups, with women at the same socio-economic level in the South likely to receive significantly better clinical quality and information than in the North. For instance, women in the poorest population quintile in the South received significantly better clinical quality of

Table 2 Percentage of women (who had at least one antenatal consultation) reporting ever performance of different components of antenatal care in north and south India by the type of provider

	Doctor only		Nurse only		Any provider	
	North (n = 612)	South (n = 370)	North (n = 533)	South (n = 93)	North (n = 1363)	South (n = 786)
Clinical quality of care						
Blood pressure measured (%)	53.5	93.0	19.7	48.1	40.3	87.4
Weight taken (%)	33.0	83.1	16.0	58.9	27.1	79.6
Blood examination (%)	49.2	84.6	22.2	41.6	40.4	78.6
Urine examination (%)	47.2	85.5	19.2	35.5	37.9	77.1
Abdomen examination (%)	69.1	94.5	48.6	66.1	62.7	89.7
Overall index of clinical quality (0–5)	2.52	4.40	1.26	2.5	2.1	4.1
Information provided						
Diet (%)	65.5	76.7	43.4	69.6	56.6	79.9
Danger signs (%)	28.8	47.6	16.5	34.1	23.3	44.1
Delivery care (%)	33.0	49.8	16.2	46.8	27.3	53.9
New born care (%)	28.7	41.5	12.4	40.5	23.6	47.6
Family planning (%)	15.9	35.6	12.2	54.7	14.7	43.3
Overall index of information given (0–5)	1.7	2.5	1.0	2.5	1.5	2.7
Prophylactic treatment						
Antenatal tetanus toxoid (%)	90.1	95.9	90.3	86.3	89.2	95.1
Antenatal iron/folic acid supplementation (%)	67.3	87.6	50.9	82.9	60.2	88.0

The north–south differences are statistically significant at 95% level for all the indicators except for antenatal tetanus toxoid for doctor, nurse and any provider. The differences between doctor and nurse is also statistically significant at 95% level within north and south India except for information on new born care and delivery care in South India.

care (index of clinical quality of care was 3.7 versus 1.8) and much better information (index of information given 2.8 versus 1.3) than their counterparts in the North from doctors. The North–South differences were more profound among the disadvantaged groups of women than among the better-off groups (e.g. the North–South difference in the poorest quintile for clinical quality of care index for doctors was 1.9 compared with 1.2 in the richest quintile). Similar differences were seen for nurses as well and by the education and caste of women (Table 3). The North–South and socio-economic differentials were the narrowest for the tetanus toxoid vaccination, an interesting finding explored further in the discussion.

Differentials in the interpersonal quality of care

Table 4 presents the levels and socio-economic differentials, separately by public and private facility, in the self-reported interpersonal quality of care during the last visit to a health facility for antenatal care. As with quality of clinical care and information provided, the socio-economic differentials in the interpersonal quality of care were observed in both north and south India and in both public and private sectors, although women in both north and south India reported better interpersonal quality of care in the private sector. However, women

at the same socio-economic levels were likely to report better interpersonal quality in the South and in the private sector than in the North and in the public sector, respectively. Almost all women—both from poor and rich households—in both north and south India reported providers spending enough time during their visit in private facilities.

In both public and private sector, no statistically significant differences were observed by household wealth, except for the indicator of 'provider speaking nicely' in the South in the private sector; however, we do not see any consistent increasing or decreasing trend. No significant differences were seen by caste in the private sector, though the differences were significant in the public sector in both north and south India. Significant differences were seen by women's level of education. Illiterate women reported significantly poorer interpersonal quality of care for all the three indicators in both the North and the South. Significant differentials were also seen by rural–urban residence in the pubic sector, especially in the North (Table 4).

Multivariate analysis

Adjusted association between quality of care indexes and socio-economic variables. The differentials in the quality of clinical

Table 3 Differentials in the quality of antenatal care by socio-economic characteristics of women from north and south India separately by type of provider (for women who had births in the last 6 months of the survey)

	Clinical quality of care (0–5)				Information given (0–5)				Antenatal tetanus toxoid (%)				Iron/folic acid (%)			
	Doctors		Nurses		Doctors		Nurses		Doctors		Nurses		Doctors		Nurses	
	North	South	North	South	North	South	North	South	North	South	North	South	North	South	North	South
Household wealth																
Poorest	1.8***	3.7**	0.9***	2.5*	1.3***	2.8	0.9*	2.46	80.1***	89.5	90.1	85.8	53.8***	74.2**	43.7**	88.1
Second poorest	1.7	4.1	1.0	1.6	1.4	2.3	1.0	2.16	80.5	95.5	86.5	82.6	42.7	85.1	42.4	74.3
Middle	2.3	4.4	1.0	2.7	1.5	2.4	0.9	2.57	91.2	95.7	90.3	84.1	70.6	92.3	52.7	76.2
Second richest	2.6	4.6	1.7	3.2[a]	1.9	2.4	1.1	2.87[a]	91.9	96.1	93.6	100.0[a]	74.6	89.9	63.3	100.0[a]
Richest	3.6	4.8	2.4	3.8[a]	2.2	2.8	1.4	2.11[a]	100.0	100.0	95.7	100.0[a]	84.0	90.0	63.9	100.0[a]
Caste																
Scheduled caste	2.2***	4.1	1.3	2.3	1.5	2.4	1.3**	3.05***	87.5**	98.0	91.1	89.4	60.0***	81.8	47.5*	84.5
Scheduled tribe	1.8	4.3	0.9	2.3[a]	1.5	1.5	0.9	1.38[a]	75.7	82.6	87.4	85.5[a]	56.0	73.2	61.3	85.7[a]
Other backward	2.3	4.5	1.2	2.8	1.8	2.6	1.1	2.52	89.8	95.1	91.4	85.5	63.2	91.9	43.3	83.4
General	2.9	4.4	1.5	2.2[a]	1.8	2.5	0.8	1.07[a]	94.0	96.7	91.8	81.0[a]	75.5	86.7	58.0	75.5[a]
Education																
No education	1.9***	3.8	1.1	2.3	1.4	2.5	1.0**	2.03***	85.3***	90.0***	88.6*	85.0	59.6***	79.4**	44.3***	83.3
Primary	2.4	4.1	1.5	1.8	1.4	2.3	1.0	2.66	88.2	97.9	91.7	82.8	63.3	90.5	61.1	75.9
Secondary/higher	2.5	4.7	1.5	3.2	2.2	2.5	1.1	2.96	97.3	98.0	96.0	90.2	79.5	90.6	68.0	86.2
Residence																
Rural	2.2**	4.3	1.1**	2.4	1.7	2.5	0.9	2.3**	87.1	95.0	89.9	85.8	61.4**	86.3	47.3**	86.8
Urban	3.1	4.6	2.3	2.9	1.8	2.5	1.3	3.1	95.9	97.5	97.4	88.7	79.0	90.1	68.3	64.3

The statistical significance (*P*-values) indicates that the differentials within a particular sub-group (household wealth, caste, education and residence) are significant. These do not indicate the statistical significance comparing a particular population sub-group across north or south India. *P < 0.10; **P < 0.05; ***P < 0.001. [a]Estimates should be interpreted with caution due to small sample size (*n* < 159).

Table 4 Differentials in the self-reported interpersonal quality of care from north and south India separately for public and private providers

	Provider spoke nicely (%)				Did not respect the need for privacy (%)				Spent enough time (%)			
	Public		Private		Public		Private		Public		Private	
	North ($n = 420$)	South ($n = 228$)	North ($n = 346$)	South ($n = 486$)	North ($n = 420$)	South ($n = 228$)	North ($n = 346$)	South ($n = 486$)	North ($n = 420$)	South ($n = 228$)	North ($n = 346$)	South ($n = 486$)
Overall	48.8	67.9	70.1	86.4	20.5	11.6	10.3	3.4	92.7	92.7	97.6	98.9
Household wealth												
Poorest 20%	52.1	61.2	60.3	91.7**	28	19.3	7.8	1.9	92.2	84.6	96.1	98.7
Second poorest	57.6	59.7	70.7	75.5	13	9.9	7.1	5.4	94.2	100	94.8	97.1
Middle	51.3	69.5	76.2	83.6	24.9	12	12.8	4	91.2	92.5	97.7	100
Second richest	48.8	74.9	67.9	83.9	17.3	5.8	9.9	4.4	96.5	94.2	100	100
Richest	38.7	70.1	71.4	93.3	21.9	11.2	13.3	2.3	88.3	94.2	97.1	98.5
Caste												
Scheduled caste	38.3***	62.8*	65.3	86.2	22.5	19.9***	11.6	2	79.6***	92.1	94.6	98.9
Scheduled tribe	50.2	33.5	71	84	19.5	49.4	7	0.0	97.6	75.7#	100	100.0#
Other backward	47	77.9	68.4	86.1	26.7	4.6	8.7	5.4	95.5	94.8	95.3	98.1
General	55.3	59.9	72.4	86.9	14	7.5	11.2	1.1	95.4	92.5	99.4	100
Education												
No education	41.0**	58.7*	57.6***	74.7***	24.2*	16.6*	17.5***	4.5***	89.9**	89.7*	95.7	98.7
Primary	54.7	72.9	85.3	85.1	12.3	6.8	2.3	1.4	93.3	95.1	100	99
Secondary/higher	65.8	73.8	80.4	91.2	16.7	9.4	4.2	2.4	100	94.3	98.4	98.9
Residence												
Rural	41.3***	73.2**	69.6	86.6	25.1***	11.7	10.9	4.3	90.0***	95.1**	96.3	98.8
Urban	69.0	51.9	71.3	86.1	7.9	11.3	9.1	1.6	100.0	85.5	99.6	99.0

The statistical significance (P-values) indicates that the differentials within a particular sub-group (household wealth, caste, education and residence) are significant. These do not indicate the statistical significance comparing a particular population group across north or south India; *$P < 0.10$; **$P < 0.05$; ***$P < 0.001$.

Table 5 Results of multivariate linear regression to predict adjusted relationship between the quality of care and women's socio-economic, demographic and healthcare background factors

	Clinical quality of care		Information provided		Interpersonal quality of care	
	Coeff.	95% CI	Coeff.	95% CI	Coeff.	95% CI
Region (South)	−1.51***	−1.67 to −1.35	−0.91***	−1.09 to −0.73	−0.19***	−0.26 to −0.12
Wealth quintile (poorest)						
Second poorest	0.02	−0.23 to 0.28	0.00	−0.24 to 0.24	0.04	−0.06 to 0.14
Middle	0.22*	−0.01 to 0.45	0.05	−0.17 to 0.27	0.03	−0.06 to 0.12
Second richest	0.48***	0.22 to 0.73	0.20	−0.05 to 0.45	0.07	−0.02 to 0.17
Richest	0.93***	0.62 to 1.24	0.49***	0.16 to 0.81	0.00	−0.10 to 0.10
Caste (scheduled castes)						
Scheduled tribes	−0.03	−0.31 to 0.26	−0.36	−0.67 to −0.05	0.10	−0.09 to 0.29
Other backward	0.06	−0.13 to 0.25	−0.07**	−0.28 to 0.13	0.07	−0.02 to 0.17
General	0.01	−0.21 to 0.22	−0.39***	−0.60 to −0.19	0.09*	−0.01 to 0.19
Education (none)						
Primary	0.14	−0.05 to 0.33	0.17	−0.05 to 0.39	0.24***	0.14 to 0.33
Secondary	0.61***	0.41 to 0.80	0.34	0.14 to 0.54	0.24***	0.17 to 0.31
Urban (rural)	0.24***	0.07 to 0.41	0.08	−0.12 to 0.27	0.03	−0.03 to 0.09
Provider (only nurse)						
Both doctor and nurse	1.36***	1.15 to 1.57	0.70	0.47 to 0.93		
Only doctor	1.09***	0.91 to 1.28	0.40	0.23 to 0.56		
Visit to public facility (private)	NA		NA	NA	−0.24***	−0.31 to −0.17
Constant	3.81	3.43 to 4.20	2.91	2.51 to 3.30	2.78	2.63 to 2.92

NA, not applicable; coeff., coefficient; CI, confidence interval; *$P < 0.10$; **$P < 0.05$; ***$P < 0.001$.

care and information provided persisted by region, household wealth, education of the women, urban/rural residence (not significant for information provided) and by the type of provider after adjusting the effect of other variables in the model (Table 5). However, the differentials in interpersonal care were statistically significant only by the region, education and the type of the provider (public/private).

Association between quality of services and antenatal care utilization levels. The percentage of women receiving four or more antenatal consultations at the village level has a statistically significant positive association with all the three indices for quality of care in the multivariate analysis after controlling the effects of other potentially confounding factors (Table 6). Although this analysis assumes that all the women in the village receive the same level of quality (which is certainly not true considering significant differentials in the quality of services), the result do provide some idea of relative importance of quality vis-à-vis access. The results show that the quality is a more significant predictor of utilization (clinical quality of index $P < 0.001$ and interpersonal quality index $P < 0.001$) of utilization of antenatal care than access (proximity to public or private facility, which was statistically insignificant) (Table 6).

Discussion

The findings should be interpreted within the context of few limitations of the data. The utility of each of the component of antenatal care in ensuring successful maternal and child outcomes even when performed properly is equivocal [21]. Therefore, the study attempts only to examine the performance of standard components of antenatal care as suggested by technical committee of the World Health Organization [1]. Measuring the clinical quality only by enquiring about the *ever* performance of each component of antenatal care may not capture the quality dimension completely without assessing regular, consistent and proper performance of each component during each visit, which must inevitably affect the effectiveness of the procedures that require regular attendance [21]. The systematic differentials in recall of performance of different components of antenatal care by socio-demographic characteristics may yield false differentials in the quality of care by socio-economic characteristics. To assess the magnitude of this potential source of bias, the responses of the women who gave births in the last 6 months were compared with the women who gave births in the last 3 years. No significant differences were observed between the two samples, alleviating some of our apprehensions on this count. Secondly, consistent reporting of significantly higher quality of care by women in the South at the same education level as in the North does alleviate some of the concerns that illiterate women may not be able to recall the components performed during antenatal visits.

Almost one-third of the women, especially the poor women, in north India reported antenatal care not necessary or customary as the reason of non-utilization of antenatal care. This is consistent with the findings in other household surveys whereby quality or access to services is rarely

Table 6 Unadjusted and adjusted (multivariate linear regression) estimates at a village level predicting percent of women who had four or more antenatal consultations

Independent variables	Unadjusted		Adjusted	
	Coeff.	95% CI	Coeff.	95% CI
State (Uttar Pradesh)	−0.247***	−0.285 to −0.209		
Andhra Pradesh	0.375***	0.313 to 0.436	0.423***	0.384 to 0.463
Bihar	−0.205***	−0.249 to −0.162	−0.016	−0.044 to 0.012
Karnataka	0.347***	0.284 to 0.410	0.387***	0.348 to 0.425
Madhya Pradesh	0.764***	0.698 to 0.830	0.596***	0.535 to 0.657
Rajasthan	−0.175***	−0.221 to −0.128	0.072***	0.044 to 0.100
Tamil Nadu	−0.155***	−0.202 to −0.108	0.089***	0.061 to 0.117
Kerala	0.474***	0.411 to 0.536	0.462***	0.417 to 0.506
Population of the village	0.000***	0.000 to 0.000	0.000	0.000 to 0.000
Distance from district headquarter	0.000	−0.001 to 0.001	−0.001***	−0.001 to 0.000
All weather road within 2 km	0.111***	0.077 to 0.145	0.007	−0.015 to 0.028
Percentage of population within 2 km of nearest transport service	0.128***	0.094 to 0.162	0.001	−0.021 to 0.022
Public health facility (other than sub − center) with 5 km	0.149***	0.116 to 0.183	0.009	−0.010 to 0.028
Private clinic/hospital with 5 km	0.112***	0.078 to 0.147	−0.006	−0.025 to 0.013
Percentage of women with >8 years of schooling	1.540***	1.428 to 1.651	0.408***	0.314 to 0.503
Clinical quality of index	0.136***	0.128 to 0.144	0.035***	0.027 to 0.042
Information quality index	0.137***	0.124 to 0.151	0.009*	−0.001 to 0.019
Interpersonal quality index	0.238***	0.222 to 0.254	0.023***	0.008 to 0.037

$*P < 0.10$; $***P < 0.001$.

mentioned as a reason for non-utilization. Simplistic interpretation of these data often leads to conclusions that the lack of demand or information is the main reason for the lower utilization of services often leading, in turn, to inappropriate policy choices of spending resources in educating women about the importance of antenatal care. However, poor quality of services—both clinical and interpersonal— women receive, e.g. in north India, may partly shape some of the attitudes leading to underutilization of antenatal care. A previous qualitative study in India also noted that simple provision of services did not ensure utilization; women had to first perceive the benefits of service to outweigh the cost [22].

The relatively poorer quality of antenatal care received by the poor and illiterate women especially in north India confirms the 'inverse health care law', where persons who need it the most get the least [23]. The Working Group on Health of Women and Children for the Government of India highlighted the missed targets on maternal and infant mortality rate in the 10th Plan period (2002–2007) mainly due to poor performance in north Indian states [24]. Since the utilization of antenatal care is nearly universal among better-off groups with much better quality of care, any further gains in infant and maternal mortality will come from improvement in quality and coverage in the disadvantaged groups with higher mortality rates. The much better quality of antenatal care in the southern states for the disadvantaged group of women suggests that better quality for disadvantaged women can also be achieved in the northern states.

It is also difficult to ascertain whether the socio-economic differentials within each region are due to active discrimination by the providers or due to greater empowerment of the better-off women to demand higher quality services from the providers. Recent quantitative study from Mexico shows active discrimination of providers toward disadvantaged women [16]. The first scenario demands active programs to sensitize the providers and action against erring providers. The second scenario suggests the need for continued investment in women's empowerment programs and policies to make them demand better quality of antenatal care.

Past comparative researches in India have highlighted significant differences in health service utilization between north and south Indian states [25] and attributed these north–south differentials to differences in culture, economy, politics and history [26]. This study examined another potential explanatory factor—the quality of health services—with specific reference to antenatal care, for the observed differentials in the utilization of health care services. Overall better quality of clinical and interpersonal care assisted by right attitude of providers irrespective of women's socio-economic status may increase the utilization of health services.

The NRHM of the Government of India, launched in 2005, also rightly prioritizes north Indian states for concerted efforts to improve maternal health [27]. Rural health care, in most of these states, is marked by absenteeism of doctors/health providers, low levels of skills, shortage of medicines, inadequate supervision/monitoring and callous

attitudes [24]. If the quality of services was as significant as the availability of the services in ensuring better utilization and improved outcomes, it would be prudent for NHRM to endorse concurrent strategies aimed at enhancing both access and quality.

The results show that nurses provided poor quality of services than doctors, and were bypassed by majority of women in favor of much less accessible doctors. One of the core strategies of NHRM is to promote access to improved healthcare though the female health activist (called as ASHA). Theoretically, nurses should be as competent as doctors in providing basic primary health care such as antenatal care. However, the data (especially the narrow north–south differentials in tetanus toxoid immunization) suggest that although nurses, even in North, are able to provide clearly defined services that can be provided even in non-clinical setting (e.g. tetanus toxoid immunization, distribution of iron/folic acid tablets), they provide poor clinical services that require regular examination and follow-up of women. Strategies to improve access through increasing deployment of health workers such as ASHA by NRHM will be successful only if the quality of services provided by them is good.

The findings reflect on the wider health systems also, as the quality of antenatal care cannot be poor in isolation [28]. Two of the states in the northern region—Uttar Pradesh and Bihar—have lowest rates of utilization of public health services [29]. Hopefully, some of the key strategies adopted under NHRM including establishing 'Public Health Standards' and community participation through decentralized planning will improve the overall quality of health services, especially for disadvantage women in north India.

The next NFHS data (2005–2006) are likely to be available soon [30]. It would be important to investigate how the quality of antenatal care and the utilization have improved since 1998–99, especially given the scaling-up of the Reproductive and Child Health program implementation and the rapid economic growth that has taken place in India since 1998–99. Our study results would provide important baseline in assessing the trends in the quality of care and the utilization of antenatal care.

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References

1. World Health Organization. *Antenatal Care: Report of a Technical Working Group*. Geneva: World Health Organization, 31 October–4 November 1994.

2. World Health Organization. *World Health Report 2005: Make Every Mother and Child Count*. Geneva: World Health Organization, 2005.

3. Sikosana PL. An evaluation of the quality of antenatal care at rural health centers in Matebeleland North Province. *Cent Afr J Med* 1994;**40**:268–72.

4. Mcdonagh M. Is Antenatal care effective in reducing maternal morbidity and mortality? *Health Policy Plan* 1996;**11**:1–15.

5. Bloom SS, Lippeveld T, Wypiz D. Does antenatal care make a difference to safe delivery? A study in urban Uttar Pradesh, India. *Health Policy Plan* 1999;**14**:38–48.

6. Gwatkin DR. Health inequalities and the health of the poor: What do we know? What can we do? *Bull World Health Org* 2000;**78**:3–18.

7. Bhatia JC, Cleland J. Determinants of maternal care in a region of South India. *Health Transit Rev* 1995;**5**:127–42.

8. Navaneetham K, Dharmalingam A. Utilization of maternal health services in Southern India. *Soc Sci Med* 2002;**55**:1849–69.

9. Pallikadavath S, Foss M, Stones RW. Antenatal care: provision and inequality in rural north India. *Soc Sci Med* 2004;**59**:1147–58.

10. Ram F, Singh A. Is antenatal care effective in improving maternal health in rural Uttar Pradesh? Evidence from a District Level Household Survey. *J Bios Sci* 2006;**38**:433–48.

11. Becker S, David HP, Ronald HG et al. The determinants of use of maternal and child health services in Metro Cebu, The Philippines. *Health Transit Rev* 1993;**3**:77–89.

12. Magadi MA, Madise NJ, Rodrigues RN. Frequency and timing of antenatal care in Kenya: explaining the variations between women of different communities. *Soc Sci Med* 2000;**51**:551–61.

13. Celik Y, Hotchkiss DR. The socio-economic determinants of maternal health care utilization in Turkey. *Soc Sci Med* 2000;**50**:1797–1806.

14. Haddad S, Fournier P, Machouf N et al. What does quality of care mean to lay people? Community perceptions of primary health care services in Guinea. *Soc Sci Med* 1998;**47**:381–94.

15. Schuler SR, Hossain Z. Family planning clinics through women's eyes and voices: a case study from rural Bangladesh. *Int Fam Plan Perspect* 1998;**24**:170–5, 205.

16. Barber SL, Bertozzi SM, Gerler PJ. Variation in prenatal care quality for the rural poor in Mexico. *Health Aff* 2007;**26**:310–23.

17. International Institute for Population Sciences. National Family Health Survey (NFHS-2), 1998–99: India. Mumbai: International Institute for Population Science, 2000.

18. Donabedian A. The quality of care: How can it be assessed? *JAMA* 1988;**260**:1743–8.

19. Hulton LA, Matthews Z, Stones RW. Applying a framework for assessing the quality of maternal health services in urban India. *Soc Sci Med* 2007;**64**:2083–95.

20. Stata Corporation. *Stata reference manual, Version 8.0.* College Station, TX: Stata Press, 2003.

21. Griffiths P, Stephenson R. Understanding user's perspectives of barriers to maternal health care use in Maharashtra, India. *J Biosocial Sci* 2001;**33**:339–59.

22. Hart J. The inverse care law. *Lancet* 1971;**360**:405–12.

23. Government of India. *Report of the Working Group on Health of Women and Children for the Eleventh Five Year Plan (2007–2012).* New Delhi: Planning Commission, 2006.

24. Basu AM. Mother's education and childhood mortality: the status of women as a 'proximate' determinant. In: Visaria L, Simons J, Berman P(eds). *Maternal Education and Child Survival.* Delhi: Vikas Publishing House Pvt. Ltd., 1997.

25. Sopher DE (ed). *An Exploration of India: Geographical Perspectives and Society and Culture.* London: Longman Group Ltd., 1980.

26. Paul V. Meeting MDG G: good news from India. *Lancet* 2007;**369**:558.

27. Sunil TS, Rajaram S, Zottarelli LK. Do individual and program factors matter in the utilization of maternal care services in rural India? A theoretical approach. *Soc Sci Med* 2006;**62**:1943–57.

28. Peters DH, Yazbeck AS, Sharma R *et al. Better Health Systems for India's Poor: Findings, Analysis, and Options.* Washington, D.C.: The World Bank, 2002.

29. International Institute of Population Studies. *Fact Sheet: National Family Health Survey, India (2005–2006).* Mumbai: International Institute of Population Studies, 2007.