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ANTENATAL CARE UTILISATION IN BRAZIL AND INDIA: SCALE, OUTREACH AND SOCIOECONOMIC INEQUALITY

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2011

SUMÁRIO

RESUMO

O Cuidado pré-natal engloba um conjunto de procedimentos clínicos prestados às mulheres grávidas. Idealmente, todas as grávidas devem ter acesso adequado à assistência pré-natal, independentemente do seu estrato social, econômico, cultural e geográfico. Este artigo investiga o grau de desigualdade no cuidado pré-natal considerando um conjunto mais amplo de procedimentos além do número de visitas médicas. O estudo faz uma análise comparativa entre Brasil e Índia. Os dados são extraídos da Pesquisa Nacional de Demografia e Saúde do Brasil (DHS) e da terceira rodada de uma pesquisa equivalente na Índia (NFHS-3), ambas realizadas em 2005-06. Índices e curvas de concentração foram estimados para quantificar o grau de desigualdades socioeconômicas no pré-natal. Modelos de regressão logística foram usados para determinar a associação entre desigualdades socioeconômicas e os cuidados pré-natais. Os resultados demonstram evidências de desigualdades socioeconômicas na utilização de cuidados pré-natais e procedimentos médicos na Índia A cobertura pré-natal é relativamente maior no Brasil e distribuída uniformemente entre os diferentes grupos socioeconômicos. O caso indiano apresenta problemas de escala e de equidade na utilização. O Brasil, apesar da alta cobertura de cuidado pré-natal ainda apresenta considerável variação no uso de 6 ou mais consultas. A análise sugere que o Brasil tem sido bem sucedido na redução das desigualdades socioeconômicas ao garantir a cobertura universal para a maioria dos serviços essenciais ao cuidado pré-natal. Esse quadro é diferente na Índia, onde a utilização de pré-natal é restrita principalmente às regiões Sul e Oeste, sendo a distância entre ricos e pobres substancial. A comparação entre Brasil e Índia permitiu uma análise sistemática do atendimento pré-natal considerando países com diferentes sistemas de saúde e nível socioeconômico.

Palavras Chave: Cuidado Pré-natal, Brasil, Índia, Desigualdades Socioeconomicas, Desigualdades em Saúde

ABSTRACT

Antenatal care encompasses a broad spectrum of clinical procedures and care provided to pregnant women. Ideally, all pregnant women should have proper access to effective antenatal care irrespective of their social, economic, cultural and geographical background. This paper investigates the extent of inequalities in antenatal care and takes a step further in analysing some medical procedures followed during antenatal care in Brazil and India. Data are drawn from the 2006 Brazilian Demographic and Health Survey (DHS) and the third round of the DHS equivalent Indian National Family Health Survey (NFHS-3) conducted during 2005-06. Concentration index and concentration curves were estimated to quantify the degree of socioeconomic inequalities in antenatal care. Binary logistic regression models were used to determine the association between socioeconomic inequalities and antenatal care. The findings demonstrate evidence of wider socioeconomic inequalities in antenatal care utilisation and medical procedures in Brazil and India. Antenatal coverage is relatively much higher in Brazil and distributed uniformly across different socioeconomic groups than in India. The Indian case, however, presents problems of scale and equity in overall coverage and extent of

utilisation whereas in Brazil, despite high utilisation of care, there is still considerable variation in the use of 6 or more ANC visits. The analyses suggest that Brazil overall has succeeded in reducing socioeconomic inequalities guaranteeing universal coverage to most essential antenatal services. This is different in India where antenatal utilisation is restricted mostly in southern and western geographical regions, yet the gap between the rich and the poor is substantial. The comparison between Brazil and India enabled a systematic examination of antenatal care taking into account different institutional and health policy regimes and socioeconomic background.

Keywords: Antenatal Care, Brazil, India, Socioeconomic Inequality, Health Inequalities

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INTRODUCTION

Antenatal care encompasses a broad spectrum of clinical procedures and care provided to pregnant women aimed at improving maternal wellbeing and infant health outcomes. The WHO recommends that all pregnant women should receive care during early stages of pregnancy within the first trimester followed by at least 4 antenatal visits (WHO, 2006). However, there is a debate even in high income countries on the extent of antenatal care needed for ensuring safe pregnancy and delivery outcomes; some care components are deemed essential while others regarded as optional.

Evidence from systematic reviews, observational and experimental studies show mixed results on the effectiveness of antenatal care in improving maternal and child health outcomes – indeed most studies attributed the evaluation outcomes to the type of intervention and implementation strategies in different socio-cultural contexts (Di Mario et al., 2005; Carroli, Rooney & Villar, 2001; BergsjØ, 2001; Jowett, 2000; Bloom et al., 1999). In low income and resource poor settings, despite insufficient coverage, cost effective and appropriate antenatal interventions have proved to be effective (Goldie et al., 2010; Adam et al., 2005; Jowett, 2000). The benefits of antenatal care in these settings are widely acknowledged in the literature, including reduction of neonatal tetanus (Calderon et al., 2006; Darmstadt et al., 2005; Adam et al., 2005); reduction of low birth weight (Wehby et al., 2009; Coimbra et al. 2007; Darmstadt et al., 2005; Silveira & Santos 2004); screening and management of infectious diseases (Osungbade et al., 2008; Fillip et al., 2006; Calderon et al., 2006); detection and treatment of urinary tract infections (Adam et al., 2005; Carroli et al., 2001).

Particularly, research in India show that women who had at least one antenatal visit had higher chances of survival compared to those with no care (Jejeebhoy, 1997). Taguchi et al. (2003) argue that fewer than four antenatal visits and late initiation of antenatal care could be the greatest risk factors associated with maternal mortality in India. Furthermore, given that antenatal care is effectively utilised it may encourage women to seek treatment for pre- and post-delivery complications (Sugathan et al., 2001). In Brazil, some studies also show positive influence of antenatal care on birth weight and preterm birth outcomes (Goldani et al., 2004; Wehby et al., 2009).

Proper antenatal care should include all essential care components rather than medical procedures alone (Carroli, Rooney & Villar, 2001; Alexander & Kotelchuk, 1996; Mahan, 1996). The critical elements of antenatal care should include screening, monitoring and managing pregnancy for potential risks and medical complications as well ensuring proper advice on nutrition and wellbeing. This would inevitably require necessary health infrastructure and health professionals with appropriate skills and experience (McDonagh, 1996; Maine et al., 1994; Royston & Armstrong, 1989), particularly in poor countries where pregnant women are at increased risk of morbidity and mortality due to poverty, malnutrition and infectious diseases.

This paper investigates the extent of inequalities in antenatal care utilisation in Brazil and India and takes a step further in analysing the specific diagnostic and medical procedures followed during care. Antenatal care coverage is almost universal in Brazil, but there are still regional inequalities and gaps in quality and outreach of service provisions within the Unified Health System (Costa, Guilhemb & Walter, 2005). In India, only a three-fourth of women receive any form of care and less than a two-fifth have the recommended 4 or more visits (IIPS & ORC Macro, 2007). There

are socioeconomic, cultural and spatial barriers that explain why some women receive inadequate care in both countries. The poorest-poor, the less educated and women from socially deprived background usually have higher medical care needs but they receive inadequate care and often delay seeking health care (Victora et al., 2010; Allendorf, 2010; More et al., 2009; Ribeiro et al., 2009; Saikia & Singh, 2009; Mohanty & Pathak, 2009; Say & Raine, 2007; Sunil et al., 2006; Pallikadavath et al., 2004; Navaneetham & Dharmalingam, 2002, Magadi, Madise & Rodrigues, 2000). Physical distance to health facilities, lack of transportation and costs are major barriers to accessing antenatal care in India (Pathak, Singh and Subramanian, 2010; Titaley et al., 2010). The quality of service provision is also another factor that discourages women from using antenatal care in both countries especially in rural areas (Victora et al., 2010; Rani et al., 2008).

The comparison between Brazil and India will allow a systematic examination of antenatal care behaviour taking into account different institutional and health policy regimes and socioeconomic background. Since antenatal care policies tend to have stronger effects in poor settings, a proper comparison between Brazil and India can yield useful policy insights of the potential influence of health care reforms on antenatal behaviour and associated variations across diverse socioeconomic groups.

STUDY CONTEXT

Brazil and India are contrasting in terms of social, cultural and geographical attributes, but both are experiencing similar demographic and epidemiological transitions. India and Brazil are the second and fifth most populous countries in the world respectively, with a population of 1,214 million (GOI, 2011) in India and 190 million (IBGE, 2009) in Brazil. Brazil experienced a demographic and health transition 15 years ahead of India (Queiroz and Turra, 2010). The fertility rate in Brazil is 1.9 children per woman whereas in India it is 2.7 (IBGE, 2009; IIPS & ORC Macro, 2007). The infant mortality rate in India is 52 deaths per 1000 live births which is about three times higher than in Brazil (WHO, 2008a).

Brazil has achieved sustained economic growth although socioeconomic differences still persist. In 2005, the Gini coefficient of 0.56 ranked Brazil as one of the most unequal country in the world. In India, even though the Gini coefficient is lower (0.37) than Brazil, the level of poverty is quite high (World Bank, 2005). In 2005, about 42% of Indian population lived on less than $1.25 in comparison to 7.8% in Brazil (World Bank, 2005). Brazil is far more urbanised than India with approximately 87% living in urban areas compared to 28% in India.

The organization of health care systems is mixed in Brazil and India with a larger bulk of health expenditure incurred in the private sector –56% in Brazil and 68% in India (GOI, 2010; WHO, 2008b). In 2008, the health expenditure (PPP) per capita was US$904 and US$116 in Brazil and India respectively (WHO, 2008a). In Brazil, health expenditure within the private sector is managed by healthcare insurance whereas in India out-of-pocket payment is more widespread – about 75% (WHO, 2008b). About 25% of population in Brazil is covered by private insurance when compared to 10% in India (IBGE, 2009; India Health Care, 2011).

Regarding to the structure of the public health systems, Brazil and India share some similarities. Both counties have established community and primary health care centres with the purpose of providing integrated curative and preventive healthcare. In Brazil, the Unified Health System provides universal, integrated and free health care services. Antenatal care programmes have been given high priority since 2000 when the 'Program for Humanization of Prenatal and Childbirth Care' was implemented (Serruya et al., 2004). This programme specifically focused on expanding the coverage and providing access to high quality antenatal care services. In India, the 'National Rural Health Mission' (NRHM) was officially launched in 2005 with the purpose of reducing maternal and infant mortality rates, and promoting institutional delivery particularly among young women living below the poverty line (GOI, 2005). This has been facilitated through the Accredited Social Health Activists (ASHA) - an interface between the community and the public health system coordinated by female health workers. Prior to this, a Reproductive and Child Health programme has been implemented since 1997-98 focusing on the underserved and poorest-poor segments of the society (GOI, 2001; 2003).

DATA AND METHODS

Data

Data for the analyses are drawn from the 2006 Brazilian Demographic and Health Survey (DHS) and the third round of the DHS equivalent Indian National Family Health Survey (NFHS-3) conducted during 2005-06. Both datasets are nationally representative surveys of women aged 15-49. The Brazilian DHS interviewed 15,575 women and the Indian NFHS interviewed 124,385.

Both surveys collected information regarding antenatal care services for all live births during the five years preceding the survey. The analyses in this paper are restricted to the last live birth. The number of women interviewed who had at least one child during this period is 4,712 in Brazil and 36,811 in India.

Outcome variables

The outcome variables include reported number of antenatal visits, and diagnostic and medical procedures followed during antenatal visits. Antenatal visits are categorised into less than 4 and 4 or more visits based on the international standards recommended by the World Health Organisation (WHO, 2006). Additionally, we considered another cut-off point: less than 6 and 6 or more antenatal visits, as recommended by the Brazilian Ministry of Health (Serruya et al., 2004, Silva et al., 2005). The diagnostic and medical care components considered include tetanus immunization, blood and urine tests, blood pressure examination and iron and folic acid intake. These are measured as dummy variables indicating whether or not the woman received a specific component of care during antenatal visits.

Predictor variables

The main predictor variable considered is the household asset index. In the absence of direct data on income or expenditure in the DHS, the analyses considered an asset index based on the ownership of household assets, largely used as a proxy for assessing the economic status of the households (Pathak, Singh and Subramanian, 2010; Rowe et al., 2008; O'Donnell et al., 2008; Johnson and Bradley, 2008; Rutstein, 2008; Gwatkin et al., 2007; Vyas and Kumaranayake, 2006; Rutstein and Johnson, 2004; Filmer and Pritchett, 2001; Montgomery et al., 2000). The wealth index is estimated by using the principal component analysis (Filmer and Pritchett, 2001). To ensure consistency, the analyses considered similar set of variables to construct wealth index in Brazil and India.

Other variables controlled in the analyses include woman's age, health insurance coverage, education of women, type (rural-urban) and geographical region of residence. The DHS in Brazil asked women directly on whether they had a general health insurance at the time of survey whereas in India the head of household was asked whether the household had any form of health insurance.

Analytical approach

To analyse socioeconomic inequalities in antenatal care, we derived Concentration Curves, a graphical representation based on the estimation of Concentration Indices (CI). The CI measures the relationship between the accumulated proportions of individuals ranked by their socioeconomic status against the cumulative proportion of utilisation of healthcare (O'Donnell et al., 2008; Kakwani et al., 1997; Mannor et al., 1997; Van Doorslaer and Wagstaff, 1992; Wagstaff et al., 1991). The diagonal represents perfect equality in the distribution. When the concentration curve overlaps the diagonal, then CI is zero. The concentration curve can also cross the diagonal. If the areas above and below the diagonal cancel out, then CI will be equal to zero. Hence CI and concentration curves must be examined together.

The values of the CI range from -1 to 1. A value equal to 1 or -1 indicates that only the richest or the poorest individuals use the healthcare respectively. The CI are estimated by successively controlling for women's age, health insurance, education, geographical region of residence and rural and urban area. The household asset is used as a continuous measure for the estimation and rescaled in order to avoid negative values obtained in the principal component analysis.

Finally, binary logistic regression models were used to determine the effect of socioeconomic inequalities on antenatal care behaviour, adjusting for relevant control variables as discussed before. We used STATA version 10.0 for the estimation purpose.

RESULTS

Sample characteristics

The average age of the sample is 28 years (SD: 6.7) in Brazil and 26.4 in India (SD: 5.6). On average, a woman in Brazil spent 7.8 years (SD: 3.3) in the school whereas her Indian counterpart, only 4.4 years (SD: 4.9). There is considerable difference in education levels between the richest-rich and the poorest-poor, particularly in India where the poorest-poor had only a year experience in school when compared to 10 years among the richest-rich. The corresponding figures for Brazil are 5.4 and 9.8 years respectively. Another striking feature is the rich-poor gap in the health insurance coverage. In Brazil, less than 4% of poorest-poor women had health insurance coverage when compared to about 48% among those in the richest-rich category. In India, the overall level of health insurance coverage is very low, less than 1% among the poorest-poor and about 12% among the richest-rich group.

Descriptive analysis

Antenatal care is nearly universal in Brazil even across wealth quintiles (Table 1). At least 95% of all eligible women in Brazil had received some form of antenatal care. The wealth gradient is more accentuated in India where only 58% of the poorest-poor had any antenatal care when compared to 97% among the richest-rich. The frequency of antenatal visits is also considerably higher among wealthier groups in both Brazil and India: however, the difference in average antenatal visits between the richest and the poorest is relatively much higher in India than in Brazil. Little more than 50% of the Brazilian women in the poorest-poor group had 6 or more visits and this is less than 5% among their counterparts in India. The poorest-poor in India are far more disadvantaged in antenatal care utilisation – over 80% had not received even the recommended 4 visits.

Among those who received antenatal care in Brazil, the level of coverage is also very high for the selected diagnostic and medical components of care. The component that presents the lower level of coverage is folic acid supplementation. The coverage is still different among wealth quintiles indicating the presence of social inequalities. In contrast, there is substantial variation in the utilisation of care components across socioeconomic groups in India.

TABLE 1

Study sample characteristics by wealth quintiles

Variables	Brazil					India				
	Poorest	Poorer	Middle	Richer	Richest	Poorest	Poorer	Middle	Richer	Richest
Number of women with a live birth	652	774	879	1029	1362	8800	7911	7157	6664	5915
Average age (SD)	25.5	25.8	26.9	27.8	30.5	27.1	26.1	25.8	25.8	27.2
	(7.0)	(6.2)	(6.2)	(7.0)	(6.0)	(6.4)	(5.9)	(5.5)	(4.8)	(4.7)
Average number of antenatal visits (SD)	5.8	7.1	7.6	8.1	9.5	2.8	3.4	4.2	5.1	6.8
	(2.5)	(2.8)	(3.2)	(3.2)	(3.9)	(1.7)	(2.2)	(2.8)	(3.2)	(3.5)
% of women who received										
any antenatal care	94.9	99.2	98.8	99.7	100.0	58.4	69.1	80.0	90.0	97.3
4 or more antenatal visits	80.4	87.3	89.2	92.7	95.3	12.2	21.3	36.8	53.4	78.3
6 or more antenatal visits	56.7	70.1	77.6	83.6	88.9	4.7	10.2	21.5	35.0	61.5
blood test	84.7	89.9	92.5	92.8	95.2	31.1	42.7	58.5	72.5	88.8
urine test	81.1	84.1	86.4	86.1	88.1	27.0	40.0	57.7	72.3	89.3
blood pressure examination	98.7	98.1	99.8	99.5	99.7	35.8	49.0	63.6	75.7	91.2
tetanus immunisation	73.4	77.2	70.6	70.3	64.0	68.8	78.8	86.6	93.8	98.0
iron supplementation[a]	73.9	73.4	79.5	73.8	81.3	49.9	57.3	67.2	75.5	86.7
iron-folic supplementation	27.1	33.7	34.2	40.3	53.2					

Source: 2006 Brazil DHS & 2005-06 Indian NFHS

[a]Iron-folic supplementation is reported together in Indian NFHS; SD refers to Standard Deviation

Although basic antenatal care services are free at the service delivery point in both countries, differences persist in the utilisation of care by health insurance coverage (Table 2). This is further reflected in the observation that wealthier groups tend to have relatively higher insurance coverage than their counterparts – although the coverage is generally very low in India even among the middle-class groups. In India, the difference in antenatal utilisation between those with and without health insurance is less striking than that across socioeconomic groups. It has to be noted that antenatal care services are not covered under most existing health insurance schemes in India. However, having health insurance reflects more of an association with better household wealth and inclination to avail health services.

Table 3 presents the antenatal care indicators disaggregated according to the type of residence for both countries. The results for Brazil suggest that the difference in antenatal care utilisation between urban and rural areas is negligible. The main differences are observed for number of visits, folic acid supplementation and tetanus immunization. Tetanus immunization coverage is higher in rural area. In India, the rural-urban differences are huge: women belonging to urban areas report higher utilisation than those living in rural areas. The only exception is with regard to tetanus immunization where there is little difference in utilisation between rural and urban areas.

TABLE 2

Antenatal care and medical components by health insurance status

Antenatal care	Brazil		India	
	None	Has health insurance	None	Has health insurance
Average number of visits (se)	7.5	9.9	4.4	6.5
	(3.0)	(3.5)	(3.0)	(3.4)
% women who received				
any antenatal care	98.6	99.7	76.4	95.8
4 or more antenatal visits	90.3	94.7	35.4	73.2
6 or more antenatal visits	75.3	91.1	22.3	57.8
blood test	90.9	94.1	57.8	85.7
urine test	84.7	88.7	56.3	86.4
blood pressure examination	99.1	99.9	62.3	88.7
tetanus immunisation	72.5	58.7	82.8	95.7
iron supplementation[a]	75.3	81.8	64.3	85.2
iron-folic supplementation	33.7	61.1		

Data source: 2006 Brazil DHS & 2005-06 Indian NFHS

[a]Iron-folic supplementation is reported together in Indian NFHS

TABLE 3

Antenatal care and medical components by type of residence

Antenatal care	Brazil		India	
	Rural	Urban	Rural	Urban
Average number of visits (se)	6.8	8.2	2.8	5.3
	(3.1)	(3.5)	(2.9)	(3.6)
% women who received				
any antenatal care	97.1	99.3	72.1	90.6
4 or more antenatal visits	82.2	92.2	27.9	63.0
6 or more antenatal visits	68.3	80.4	16.0	45.6
blood test	90.6	92.2	50.2	80.2
urine test	83.5	86.3	48.1	80.2
blood pressure examination	99.2	99.3	55.1	83.0
tetanus immunisation	73.5	69.3	80.5	92.7
iron supplementation[a]	77.9	76.7	61.4	76.4
iron-folic supplementation	36.3	40.6		

Data source: 2006 Brazil DHS & 2005-06 Indian NFHS
[a]Iron-folic supplementation is reported together in Indian NFHS

Concentration indices

Table 4 provides the estimated CI for Brazil and India for each antenatal care indicator, controlling successively for woman's age, health insurance coverage, education, geographical region and type of residence as shown in each column of the table. The results for Brazil show the presence of social inequality in the provision of antenatal care favouring richer groups for all procedures analyzed, except in the case of tetanus immunization. The level of inequality is quite small for all indicators, which reflects relatively higher utilisation of antenatal care. The highest inequality is noted in 6 or more antenatal visits and in folic acid supplementation.

The findings in India suggest substantial inequalities favouring women belonging to the richest households in almost all antenatal procedures, except for the uptake of iron-folic acid tablets. The level of inequality is higher than the one observed in Brazil for all indicators confirming the well-known fact that inequalities are high when levels are moderate. The observation that the inequality gap is relatively smaller in the case of iron-folic supplementation and tetanus injection reflects universal access to this care component under various government sponsored programmes.

The results controlling for health insurance coverage, in addition to woman's age, show a reduction in the CI values but they remain statistically significant. This suggests that health insurance coverage is not the only source of inequality in the access to antenatal care services. Adding women's education as control, the CI values show a decrease on antenatal visits, folic acid and iron supplementation in Brazil whereas in India the reduction is reflected more on antenatal visit, blood exam, urine analysis, and blood pressure examination.

Including region of residence attenuated the magnitude of CI substantially for frequency of visits in Brazil which suggests regional differences in health care provision across the country. The indices for components blood pressure and tetanus immunisation became non-significant. Findings from India also depict the regional influence on antenatal care services utilisation, especially the frequency of visits and blood examination. These findings clearly reflect on the differences in the access and utilisation of health care services across the six geographic regions of India. Urban-rural residence is also found to have significant bearing on the CI values. The main changes observed in Brazil after adding type of residence is further reduction in CI value for 4 or more visits that becomes not significant. In India, the CI values decline significantly in five of the seven selected antenatal care procedures. Nonetheless, the values for tetanus immunization and iron-folic supplementation tend to increase which suggest differential care patterns in rural and urban areas.

The results obtained in Table 4 are validated and graphically illustrated in the form of concentration curves for selected care components. The graphs in appendix show that none of the concentration curves cross the diagonal therefore the concentration index analysis is sufficient enough to understand the magnitude of the socio-economic inequality in antenatal care utilisation.

TABLE 4

Concentration indices: antenatal care and medical components

Care components	Brazil					India				
	Age	+Health insurance	+Women's education	+Region	+Urban-Rural	Age	+Health insurance	+Women's education	+Region	+Urban-Rural
4 or more antenatal visits	0.028*	0.027*	0.021*	0.011*	0.004	0.349*	0.342*	0.203*	0.162*	0.132*
6 or more antenatal visits	0.073*	0.066*	0.050*	0.033*	0.032*	0.450*	0.438*	0.246*	0.203*	0.161*
blood test	0.017*	0.017*	0.016*	0.015*	0.017*	0.203*	0.201*	0.137*	0.118*	0.100*
urine test	0.013*	0.010*	0.009*	0.010*	0.009	0.224*	0.222*	0.156*	0.137*	0.117*
blood pressure examination	0.003*	0.002*	0.002*	0.001	0.002	0.178*	0.176*	0.116*	0.109*	0.094*
tetanus immunisation	-0.036*	-0.029*	-0.037*	-0.006	-0.006	0.028*	0.029*	0.019*	0.023*	0.025*
iron supplementation	0.016*	0.015*	0.004	-0.001	0.006					
folic supplementation	0.140*	0.109	0.070*	0.070*	0.091*					
iron-folic supplementation						0.036*	0.034*	0.000	0.000	0.005

Data source: 2006 Brazil DHS & 2005-06 Indian NFHS
* significant at p<0.05

Regression analysis

Table 5 shows the adjusted odds ratios from separate logistic models estimated to each component of ANC in Brazil and India. The results confirm those estimated using concentration index analysis. In Brazil, the poorest-poor represented in the first quintile were significantly at lower odds of receiving 6 or more visits, blood pressure examination, blood test and folic acid supplementation. The results were significant and much larger in magnitude for all care components in India.

The availability of health insurance was significant for only one care component in Brazil (folic acid supplementation). In India, health insurance status increased the odds of antenatal visits and had significant association with most care components. Educated women were considerably more likely to have had received full antenatal care; the effects are much stronger in India than in Brazil.

Women living in northern and north-eastern regions of Brazil had a lower probability of receiving frequent antenatal visits but had higher probability of receiving urine tests than women living in the mid-western region. In India, women living in the southern and western regions were significantly more likely to have utilized full antenatal care than their northern counterparts. Women living in the central region, which has the largest two states namely Uttar Pradesh and Madhya Pradesh, were relatively less likely to have received full antenatal care, except for tetanus injections and iron folic supplementation.

Urban-rural residence in India was also associated with the utilisation of antenatal care services with urban women more likely to utilize six out of the seven selected components of antenatal care than their rural counterparts. Nonetheless, urban women were at lower odds of receiving iron folic supplementation than rural women. In Brazil, the type of residence had overall little effect on antenatal care utilisation.

TABLE 5

Odds ratios for antenatal care utilization

Control Variables	4 or more visits	6 or more visits	Blood test	Urine test	Blood pressure	Tetanus	Iron suppl	Folic suppl	Iron folic suppl
Brazil									
Poorest	0.65	0.44*	0.27*	0.59	0.16*	0.90	0.74	0.40*	-
Poorer	0.75	0.60*	0.56*	0.95	0.29	1.35	0.81	0.59*	-
Middle	0.72	0.78	0.70	1.04	0.45	0.99	1.12	0.58*	-
Richer	0.91	0.95	0.75	1.00	0.62	1.16	0.77	0.73	-
Age	1.02	1.03*	1.02	1.01	1.00	1.00	1.01	0.99	-
Health Insurance	1.01	1.49	1.01	1.30	1.62	0.73	0.91	1.39*	-
Education	1.10*	1.11*	1.05	1.03	1.14*	1.04	1.08*	1.12*	-
North	0.53*	0.54*	1.08	1.47*	0.60	1.00	1.22	1.01	-
Northeast	0.76	0.65*	1.14	1.32	1.18	1.20	1.52*	1.12	-
Southeast	1.18	0.95	1.32	1.41	1.61	0.55*	1.62*	1.06	-
South	0.80	1.03	0.68	0.53*	1.41	0.81	0.70*	0.58*	-
Urban	1.64*	0.96	0.82	1.04	1.02	1.01	0.77	0.71*	-
India									
Poorest	0.14*	0.11*	0.18*	0.14*	0.15*	0.23*	-	-	0.40*
Poorer	0.21*	0.20*	0.24*	0.16*	0.21*	0.33*	-	-	0.46*
Middle	0.34*	0.33*	0.35*	0.31*	0.31*	0.48*	-	-	0.59*
Richer	0.49*	0.50*	0.50*	0.47*	0.46*	0.72*	-	-	0.67*
Age	0.99*	1.00	0.99*	0.99*	1.01	0.97*	-	-	0.98*
Health Insurance	1.15*	1.18*	1.25*	1.35*	1.15	0.96	-	-	1.27*
Education	1.13*	1.13*	1.11*	1.10*	1.11*	1.10*	-	-	1.13*
Central	0.49*	0.52*	0.38*	0.38*	0.48*	1.10*	-	-	1.11*
East	0.96	0.98	1.18*	1.01	2.14*	2.18*	-	-	1.23*
Northeast	0.89*	0.86*	0.65*	0.73*	2.32*	0.57*	-	-	0.71*
West	2.10*	2.05*	2.58*	2.22*	3.65*	1.49*	-	-	2.26*
South	6.52*	5.79*	6.77*	6.78*	9.96*	2.08*	-	-	2.31*
Urban	1.55*	1.40*	1.78*	1.86*	1.91*	1.18*	-	-	0.91*

*significant at *p<0.05*
- not applicable

DISCUSSION

Through a systematic comparison of cross-national population data from the DHS, this paper provides evidence of socioeconomic inequalities in antenatal care utilisation in Brazil and India. Antenatal care coverage is relatively much higher in Brazil and distributed uniformly across different socioeconomic groups than in India. The Indian case presents problems of scale and equity in overall antenatal care coverage and utilisation whereas in Brazil there is considerable variation only in the use of 6 or more ANC visits and folic acid supplementation between the rich and the poor.

Brazil is one of the countries which has the greatest income inequalities in the world. The foregoing analyses clearly suggest that Brazil overall has succeeded in reducing socioeconomic inequalities guaranteeing universal coverage to almost all essential antenatal care services. This is different in India where high antenatal care services utilisation is restricted mostly in southern and western geographical regions, yet the gap between the rich and the poor is substantial.

The observed differences in antenatal care behaviour across different socioeconomic groups in Brazil and India may reflect health care policies and context-specific implementation strategies for antenatal care. The Brazilian antenatal care programme was implemented in 2000 to provide better care and support to women and newborn and to reduce maternal and perinatal mortality. This particular programme increased the requirement of minimum 4 visits to 6 visits per woman and provided impetus to a wider coverage and greater access to antenatal care (Silva et al., 2005).

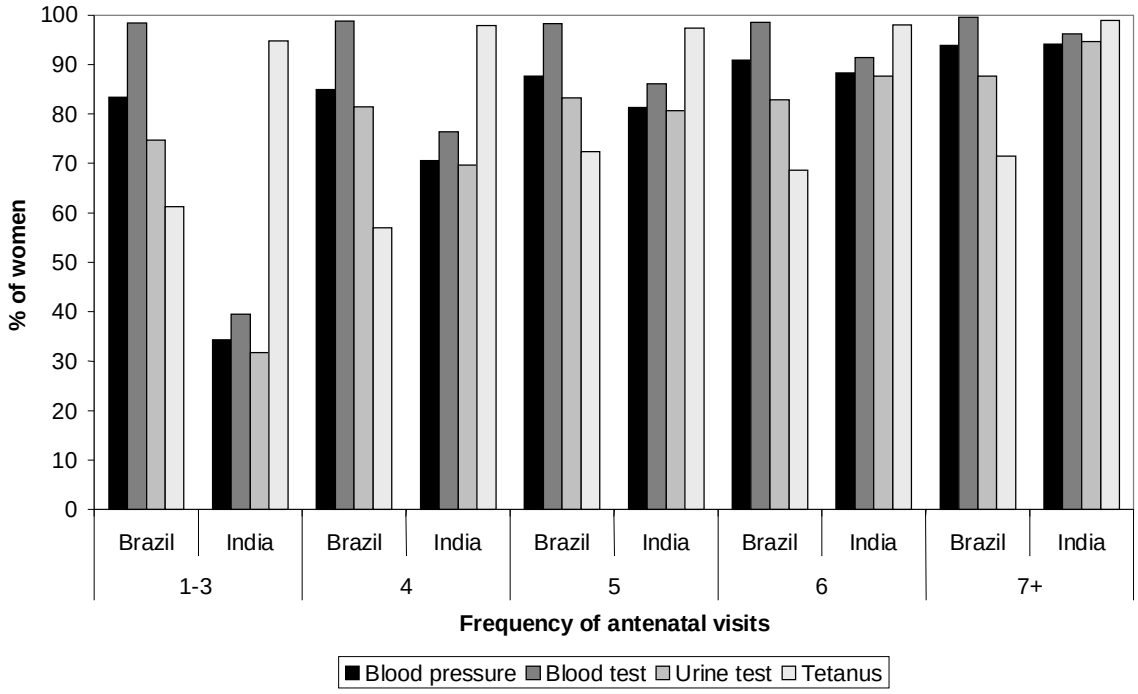
In India, a Reproductive and Child Health Programme was established during 1997-98 by integrating the already existing Child Survival and Safe Motherhood programme with other reproductive and child health services. The programme exclusively focuses on underserved and deprived population groups recommending a minimum of 3 antenatal visits which should include basic care and at least one dose of immunization against tetanus, iron and folic acid prophylaxis and anaemia management (MoHFW, 2005). The programme also includes management and referral of high-risk pregnancies especially in rural areas through a network of community, primary health care and sub-centres. In urban areas, these services are mainly available through government or municipal hospitals, urban health posts or urban family welfare centres (IIPS, 2010). Although most of these services available through public sectors are free of cost, recent evidence show that women from poorer economic background continue to bear high burden of out-of-pocket expenditure for maternal health care services. A recent study by Pathak, Singh and Subramanian (2010) showed evidence of improvements in coverage of antenatal care and skilled birth attendance in India. However this improvement occurred mainly in private healthcare facilities than in public facilities. The authors concluded that supply restrictions and poor quality of care have led to decreased utilisation of antenatal care in public sectors.

In Brazil, public policies also have contributed to a better access to healthcare services especially among poor people. Government efforts have been made to increase primary care coverage. This effort is being implemented mainly through the Family Health Programme (*Programa Saúde da Familia*) created in 1994 in order to improve prevention of illness and treatment of early bad health conditions. It focuses on the family with shifts in care from the hospital to local health centres. Data from the National Household Survey in Brazil (*Pesquisa Nacional de Amostra por Domicílios*) show that the average number of physician visits for infants below 1 year without private health insurance increased from 3.75 to 4.83 during the period 1998-2008. The coverage of Family Health Programme is considerably high mainly in rural and poor areas of the country largely contributing to narrowing the inequalities in the access to healthcare in Brazil.

There are differences in antenatal procedural guidelines between Brazil and India. In Brazil the emphasis is more on medical procedures. This is reflected in relatively higher utilisation of care in the Brazilian context where the vast majority of women receive antenatal care in health facilities while in India home-based antenatal care is common or often combined with institutional care. Antenatal guidelines in India recommends a minimum of 3 visits whereas those in Brazil recommends a minimum of 6 visits exceeding the international WHO standards of minimum 4 visits. The higher number of visits recommended by the Brazilian Government is a strategy to reduce inequalities between municipalities, as the more developed municipalities have already managed to achieve the WHO standard (Silva et al., 2005; Serruya et al., 2004).

A critical question that arises in this context is: do women receive all essential medical and diagnostic procedures within the recommended minimum 4 visits or 6 visits? If yes, are these equally distributed in all socioeconomic groups? Although this question is beyond the aim of this paper, we explored the DHS data further which reveal interesting findings. Frequent antenatal care up to 6 or more visits does influence uptake of essential medical and diagnostic care in India (Figure 1). For example, among women who had 1-3 visits in India, less than two-fifth received blood pressure examination, blood and urine tests compared to more than four-fifth who had 5 or more visits. The only procedure which is widely received within 1-3 visits is tetanus injections, which is a preventive measure against tetanus infection. This monotonic relation between amount of visits and coverage of other antenatal care procedures is also observed in Brazil even though most women receive essential components during the first few visits, especially blood test.

FIGURE 1
Medical care components received by frequency of antenatal visits (%)



Data source: 2006 Brazil DHS & 2005-06 Indian NFHS

Blood and urine tests are cost-effective laboratory procedures which can monitor risk factors and detect complications arising during pregnancy especially anaemia, syphilis, bacteruria and proteinuria. The observation that not all women receive these essential tests raises concerns and call for rethinking antenatal care policy interventions. An effective and sustainable intervention is providing necessary health care education and information services to pregnant as well as young women. Indeed, the present analyses clearly highlight the positive effect of women's education in

seeking antenatal care both in Brazil and India. The gap in women's education between the rich and the poor is relatively narrower in Brazil than in India. The poorest-poor in India are the most disadvantaged in terms of receiving education and health care and this is exactly the group that health programmes and policy interventions should target. Educated women generally understand and have the capacity to retrieve information they receive through health education programmes. Studies show evidence that maternal care services utilisation is not only determined by design and delivery strategies but also by user attributes, including education, exposure to information systems and means to afford health care (Sunil et al., 2006; Pallikadavath et al., 2004; Navaneetham and Dharmalingam, 2002). The quality of care provided in public institutions where the vast majority of poor women seek care is often reported to be poor and sub-standard which could deter women from seeking care (Hunt, 2010; Ram et al., 2006; Ramarao et al., 2001; Mavalankar, 1999).

This paper provided a broader comparison of socioeconomic inequalities associated with antenatal care utilisation in Brazil and India and yielded policy relevant results highlighting the gap between the rich and the poor. Although beyond the scope of this research, further investigation of state and regional differences would offer better insights of the levels of heterogeneity in antenatal care behaviour especially in the Indian context. There are also other attributes that could explain the differences in antenatal behaviour, for example household structure and spousal attributes, religion and caste. However, estimations were performed including these variables, especially for India and results did not change (results not shown here). Another important element that should be taken into account is the rapid decline of fertility rates in Brazil. Future policies regarding antenatal care should be designed within this fertility transition context. Indeed, there is a window of opportunity for policy makers to reorient antenatal policies emphasising more on reproductive and child health education (Wong et al., 2009; Wong and Carvalho, 2006).

Finally, it has to be noted that data on antenatal behaviour are self-reported in the DHS and might suffer from possible reporting bias. However, such biases are likely to be minimal since the information on antenatal care is based on live births that occurred within the past five years preceding the surveys. Despite these limitations, this paper has warranted policy oriented conclusions through analyses of cross-national data and contributed to a better understanding of health care inequalities, a topic highly relevant in both developed and less developed societies.

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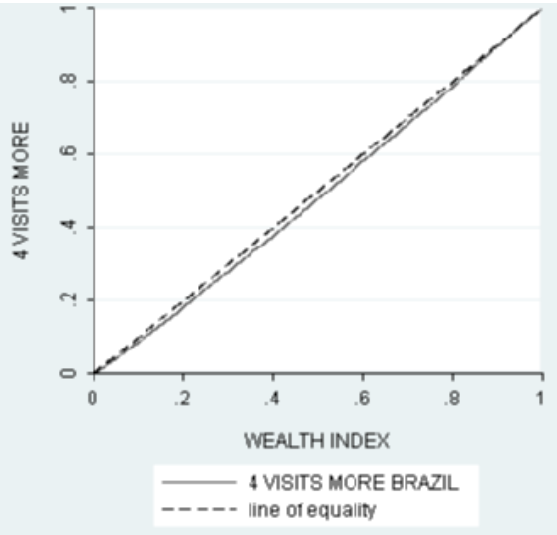
APPENDIX

FIGURE 2a

Concentration curve: 4 or more antenatal visits

Brazil



India

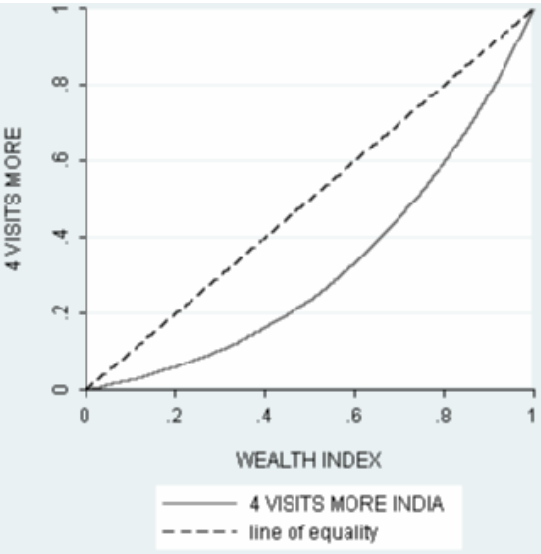
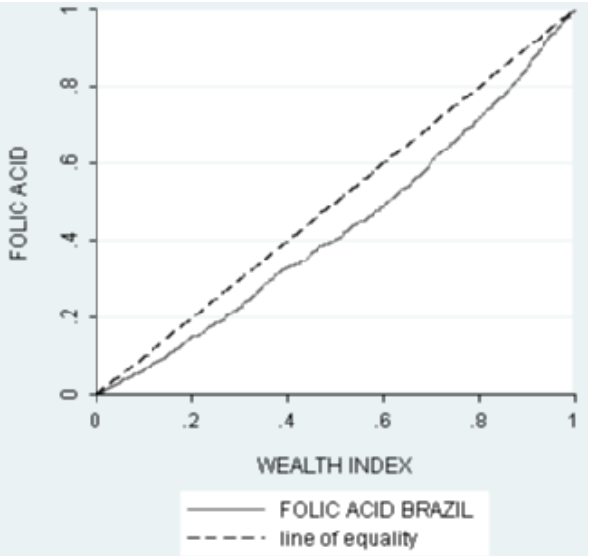


FIGURE 2b

Concentration curve: iron and folic acid supplementation

Brazil (folic acid supplementation only)



India

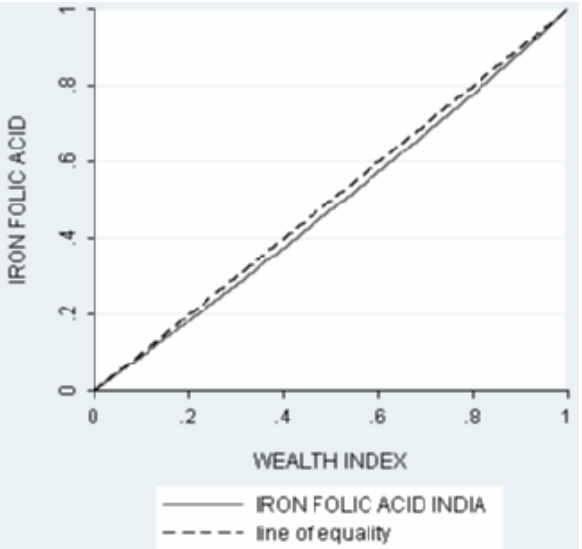
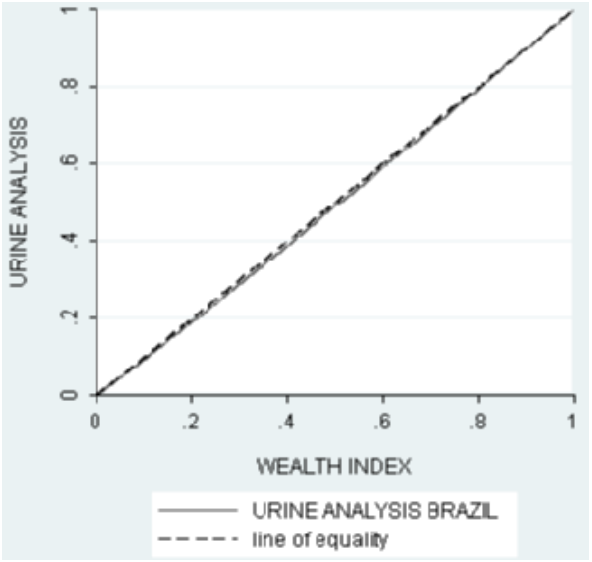


FIGURE 2c (contd)
Concentration curve: urine test

Brazil



India

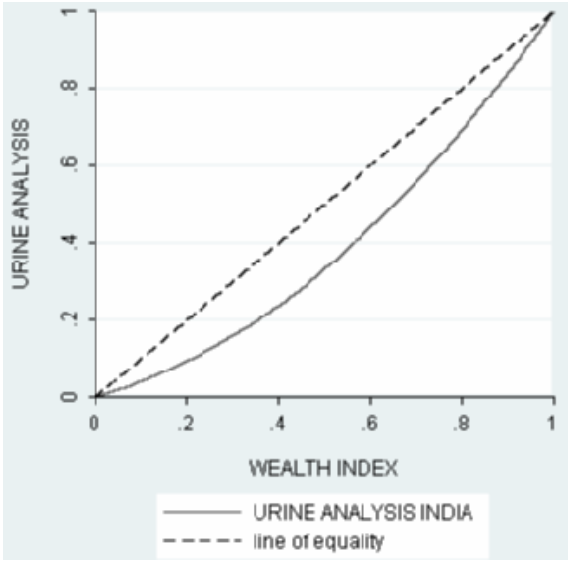
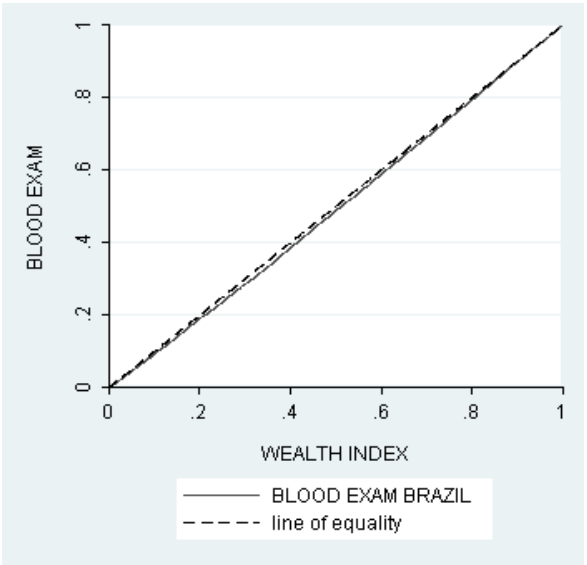


FIGURE 2d
Concentration curve: blood test

Brazil

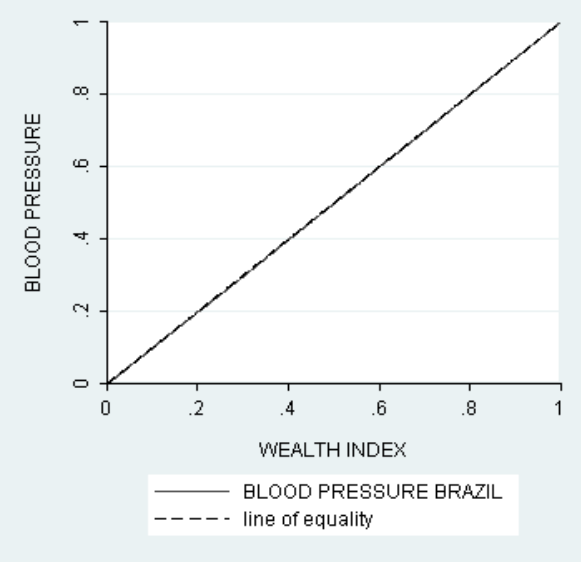


India

FIGURE 2e (contd)

Concentration curve: blood pressure

Brazil



India

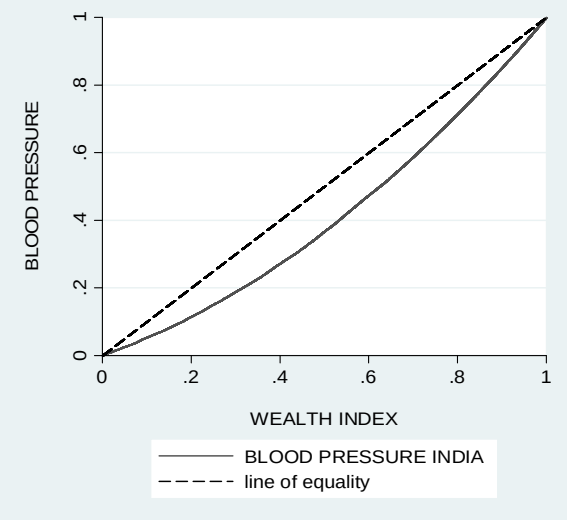
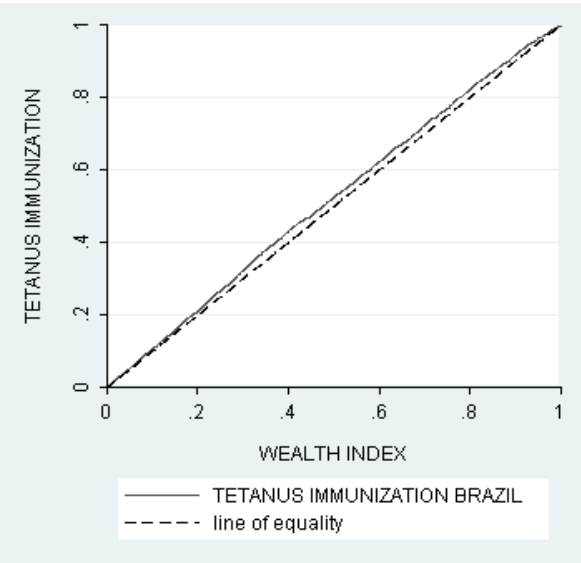


FIGURE 2f

Concentration curve: tetanus immunization

Brazil



India