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Original Research Paper

Spatial Disparity and Barriers in Utilization of Antenatal Care among Ever Married Women in India

Geography

KEYWORDS :

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ABSTRACT

Background: *An estimated half million women, each year, die from complications related to childbirth either during pregnancy, delivery or subsequently within 42 days of delivery. 99 % of the total maternal deaths occur in developing world, and India alone accounts for 22 % of the total global maternal deaths and these deaths can be prevented with key health interventions, like provision of antenatal care.*

Methodology/Finding: *This paper investigates regional differences in utilization of antenatal care as well as identifies the determinants of utilization of at least four antenatal care visits among ever married women in India. The data for present study has been drawn from three rounds of National Family Health Survey (NFHS) conducted during 1992-93, 1998-99 and 2005-06 and other countries available data (DHS). Bivariate, Chi-square test and multiple logistic regression analysis have been used to understand the trends, patterns and predictors of the outcome variables. Findings indicate that India (37 %) is far away from reaching its goal of improving utilization of antenatal care services at the world level (55.1 %). Wealth index and education are main significant predictors for under utilization of ANC services in India. Higher educated and richest women are more likely to receive antenatal care services in all regions. Religion, exposure to mass media, birth order, age of women and place of residence are other predictor of utilization of ANC services. Worse performing regions in India are northeast, central and eastern region where quality and quantity of receiving antenatal service are poor.*

Conclusion: *The results of our analysis, which indentified that uneducated woman, women from poor family, higher parity, rural and younger women are less utilizing at least four ANC visits. Government's policy should immediately focus on poor and uneducated rural women and also reduce the direct and indirect cost of visiting health facility.*

Introduction

An estimated half million women, each year, die from complications related to childbirth either during pregnancy, delivery or subsequently within 42 days of delivery [23]. Approximately 80% of the maternal deaths globally occur due to haemorrhage, sepsis, unsafe induced abortion, hypertensive disorder of pregnancy, and obstructed labour, these deaths are unreasonable and can be prevented with key health interventions, like provision of antenatal care and medically assisted delivery [11, 25, 26]. 99 % of the total maternal deaths occur in developing world, and India alone accounts for 22 % of the total global maternal deaths [23, 24]. The World Health Organization defines antenatal care (ANC) as "care before birth", and includes education, counselling, screening and treatment to monitor and to promote well being of the mother and foetus [6, 19]. In addition, antenatal care enables health personnel to identify possible risks during pregnancy or for the delivery and providing on time treatment for women experiencing health problems during pregnancy [8].For this reason the World Health Organization (WHO) recommends four Antenatal Care visits, for reducing risk during pregnancies [7].

Several studies had been done on the importance of utilization of ANC services. Antenatal care is an important predictor of safe delivery and provides health information and services that can improve the health of women and newborn [7, 14]. Insufficient antenatal care is associated with poor pregnancy outcomes [9, 10]. Moreover, studies from India have revealed that women who received ANC services had an increased possibility of receiving skilled birth attendants (SBA) during childbirth, or having an institutional delivery. In addition, ANC has a positive impact on the utilization of postnatal healthcare services, while PNC and intra partum care significantly reduce maternal mortality because most maternal deaths occur in the first week of delivery [13]. The aim of ANC services is to provide birth preparedness and complication readiness (BPACR) which will prevent, detect, and manage complications during pregnancy. Antenatal care also provides women and their families with appropriate information and advice for a healthy pregnancy, safe childbirth, and postnatal care, including care of the newborn, promotion of early, exclusive breastfeeding, and assistance with deciding on future pregnancies in order to improve pregnancy outcomes. The evidence shows that high maternal, neonatal and child mortality rates are associated with inadequate and poor-quality maternal health care services, including antenatal care, skilled attendance at birth and postnatal care [29, 30]. Many studies have shown that there are several predictors for utilization of antenatal care services. The social, family, and community milieu and beliefs affect health during pregnancy either positively or negatively. In many parts of the developing world, education of women was found to be an important predictor of antenatal care uptake. Marital status, five or more than five years of education, closeness of health facility to the village, and husband's occupation other than farmer was positively associated with the utilization of ANC services, in the Tigray region of Ethiopia [2]. A case study in rural Burkina Faso found that the predictor variables like living within 5 km from a health facility was positively associated, while religion, ethnicity, and household wealth were negatively associated with ANC utilization. The same study reported that the new financing policy had been effective in granting women of different socioeconomic status an equal chance to access maternity care services [3].

In India, Bhatia and Cleland have studied that educational level, economic status and religion of the mother are significant predictors of maternal healthcare services in state of Karnataka. Demographic variables such as order of pregnancy, marital status, maternal age, and marital duration are reported to have influence on the utilization of antenatal care [12]. Utilization of antenatal check-ups and receiving specific components is positively associated with higher socioeconomic status of women, whereas pregnant women from poor households and illiterate backgrounds with at least one child were least likely to utilize antenatal services in the four North Indian states [4]. The effect of women's autonomy on receiving ANC services varied with respect to different regions of India, in south India the finding was

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consistently associated with receiving pregnancy care [5]. Recently available data on Demographic Health Survey (DHS) report shows that India is far away from receiving at least four ANC visits (37 %) compare to a world average (55.1 %) which shows more improvement is required at national level. In this paper, we have examined the regional differences in utilization of antenatal care services as well as identified the obstacle in utilizing at least four ANC services in India.

Materials and methods

The data for present study has been drawn from three rounds of National Family Health Survey (NFHS) conducted during 1992-93, 1998-99 and 2005-06 [39, 40, 41] and other countries available data of Demographic and Health Survey (DHS) and World Health Organization (WHO) is also used for knowing where India is standing at world level. NFHS is a nationally representative, large scale, and multi-round survey. These surveys are nationally representative and cover more than 99 % of the Indian Population. NFHS is an Indian version of the Demographic and Health Survey (DHS), which provides consistent and reliable estimates of fertility, mortality, family planning, utilization of maternal and child health care services and other related indicators at both the national, state and regional levels. It provides the estimates on HIV-related knowledge, and important aspects of nutrition, and, demographic and health parameters as well as data on various socioeconomic and programmatic interventions which is critical for bringing the desired changes in demographic and other related variables.

The country's first National Family Health Survey was initiated in 1992-93 and covered sample of 88,562 household ever married women age 13-49 years in 24 states and the National Capital Territory of Delhi. NFHS-2 covered a representative sample of over 91,000 ever-married women age 15-49 years across all 26 states of India. The third National Family Health Survey (NFHS-3) was conducted in 2005-06. In addition to the indicators covered in NFHS-2, NFHS-3 provided information on several new and emerging issues such as perinatal mortality, male involvement in the use of health and family welfare services, adolescent reproductive health, high risk sexual behaviour, family life education, safe injections, and knowledge about tuberculosis. Interviews were conducted with 124,385 women age 15-49 and 74,369 men age 15-54 from all 29 states. The analysis is based on 39,643 women age 15-49 years. NFHS surveys adopted a similar systematic multistage stratified sampling design, used similar survey instruments (household and women questionnaires) which included questions that were phrased alike with similar categories, and all the surveys were conducted by the International Institute of Population Sciences (IIPS), Mumbai under the stewardship of the Ministry of Health and Family Welfare (MoHFW), New Delhi.

For the present study we have divided India into six geographical regions-(1) North (2) South (3) West (4) East (5) Northeast and (6) Central region. The base for dividing regions is according to the NFHS standard [40, 41]. Northern region comprises of states Jammu and Kashmir, Himachal Pradesh, Punjab, Haryana, Delhi and Rajasthan. Eastern region consists of Bihar, West Bengal, Jharkhand and Orissa whereas the North East region is having eight states viz., Sikkim, Arunachal Pradesh, Nagaland, Manipur, Mizoram, Tripura, Meghalaya and Assam. Central region consists of Uttarakhand, Uttar Pradesh, Chhattisgarh and Madhya Pradesh. Western region consists of Gujarat, Maharashtra and Goa. Southern region is having four states which are Andhra Pradesh, Karnataka, Kerala and Tamil Nadu.

Outcome variables

In this study, receiving at least four Antenatal care (ANC) visits is main dependent variable. World Health Organization also recommends at least four Antenatal Care (ANC) visits at any health facility for reducing risk during pregnancies. In NFHS-3, information on antenatal care visits was asked for last child in the five years preceding to the survey date and this includes ANC visit at home visit by any health professional with any health facility. In this paper we include all ANC visit either received at home or any health facility in ANC visit. The dependent variable is dichotomous indicator coded 0 if the mother not visited for at least four ANC visits during her pregnancy and 0 if mother visited for at least four ANC visits.

Exposure variables

We have used a set of theoretically important socioeconomic and demographic variables that have been associated with the utilization of antenatal care services. The study utilizes several exposure variables, that is age of respondent, place of residence, educational status, media exposure, marital status, employment status, religion, wealth quintile, birth order, women autonomy and caste of the respondents. In the NFHS, in absence of direct income or expenditure information, wealth index, based on ownership of asset, is used as proxy variable for assessing economic status of the household. Principal component analysis (PCA) is used to construct wealth quintiles and used five categories of this in our analysis. The wealth quintiles have been categorized into five groups: (i) poorest, (ii) poorer (iii) middle (iv) richer and (v) richest. Education was recorded as (i) no education, (ii) <5 years complete, (iii) 5-7 years complete (iv) 8-9 years complete (v) 10-11 years complete and (vi) 12 or more years complete. Religion was categorized into three subgroups: (i) hindu, (ii) muslim and (iii) other. Other religion includes jain, sikh, bhudhist and other relgion. Women autonomy was computed through following information- decision to go to a health facility, involvement in major and daily household purchases, decision to visit family or relatives and decision to spend the husband's money; being allowed to go out, to the market, and outside the village/community. women's autonomy index has been categorized as low, medium and high autonomy.

women's exposure to mass media is categorized in two group, first group those women who don't read newspaper at least once a week, listen to radio and watch TV at least once a week are categorized as 1 and those have categorized 2 .

The autonomy index was constructed using seven questions about various dimensions of women's autonomy. These were: decision about items to cook; who makes decisions on women's health care; who makes decisions on costly purchases; who makes decisions on a woman's stay with her parents; whether permission is required to go to market; whether permission required to visit friends; whether permission required to keep money aside. Each item was assigned a score 1 or 2; 1 to a situation where women is not a decision maker and 2 where the women is the decision maker. Thus the score for each person ranged between 7 and 14. A score 7–10 was taken to indicate low autonomy and a score 11–14 to indicate high autonomy

Analytical Approach

Bivariate, Chi-square test and binary logistic regression analysis have been used to full fill the objective of the present study. Bi- variate analysis is useful to examine the nature of relationship between utilization of antenatal care and selected socioeconomic and demographic characteris-

tics. On the other hand, Binary logistic regression was used to investigate which factor influencing the utilization of at least four antenatal care visits. STATA-12.0, ArcMap-10 and Origin-8 software is used for data analysis, preparing map and figure, respectively.

Results

Figure 1 shows that 55.1 % of pregnant women at the global level receiving at least four antenatal care visits whereas 52.4 % South-East Asian pregnant women receiving at least four antenatal care visits. In India, only 37 % of pregnant women visited for at least four ANC visit as recommended by World Health Organization (WHO). Performance of India (37.0 %) at the Global level (55.1 %) as well as South-East Asia (52.4 %) is unsatisfactory whereas in SAARC countries, India's performance is better than Bangladesh (20.6 %), Nepal (29.4 %) and Pakistan (28.4 %). In India, same pattern is found for at least one antenatal care.

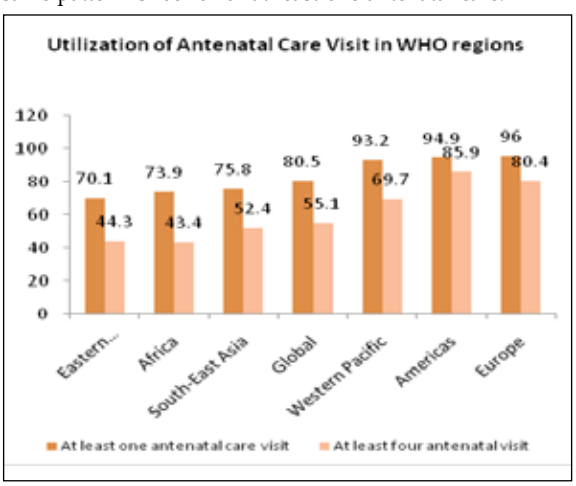

Figure 1 (a)

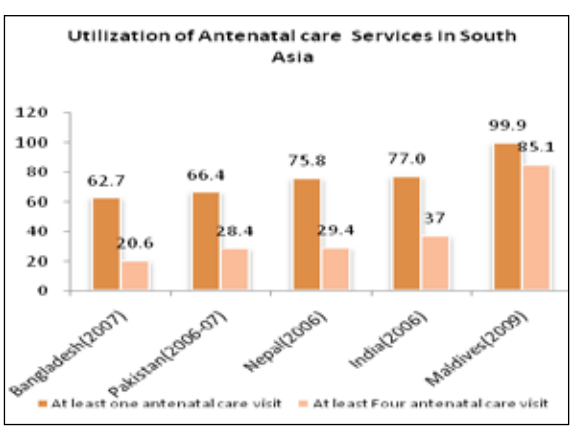

Figure 1 (b)

Figure 1 Utilization of Antenatal Care Services in Different regions of WHO & Southern Asia

Figures 2 and 3 clearly present about where India and its parts stand as compared to the world level scenario. India's status at world level, it is far away from reaching its goal of reducing maternal deaths and improving of utilization of antenatal care services. India is still far away in both indicators at least one visit and at least four visits compare to world average and furthermore progress is required in this regards. Central and eastern regions are worse performing regions in both indicators for any visit for ANC services and at least four ANC visits. Figure 3(c) shows that Tamil Nadu (87.4 %) and Kerala (93.4 %) in Southern region are the best performing states in utilization of at least four antenatal care visits. Uttar Pradesh (11.1 %) in Central region, Bihar (11.2 %) in Eastern region and Nagaland (12.1 %) in Northeast are worse performing states. Figure 2(c) show that all states of southern region are best performing states in utilization of at least one antenatal care services. Uttar Pradesh (66.0 %) in central region, Bihar (34.1 %) in eastern region, Arunachal Pradesh (52.8 %) in Northeast and Rajasthan (74.8 %) in north are the worst performing states (Figure 2 and 3).

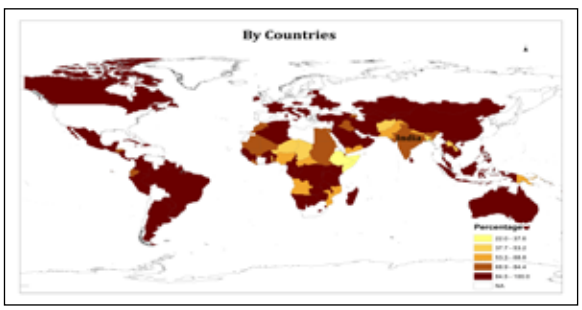

Figure 2(a)

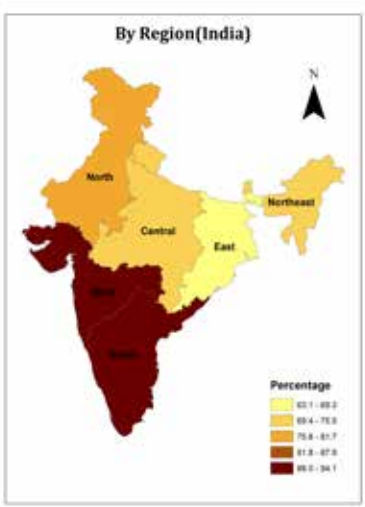

Figure 2(b)

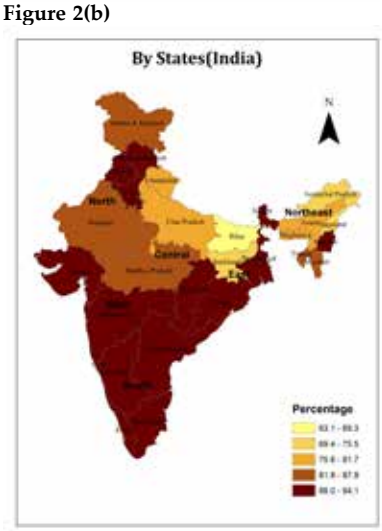

Figure 2 (c)

Figure 2.Utilization of at Least One Antenatal Care Services

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Figure 3 (a)

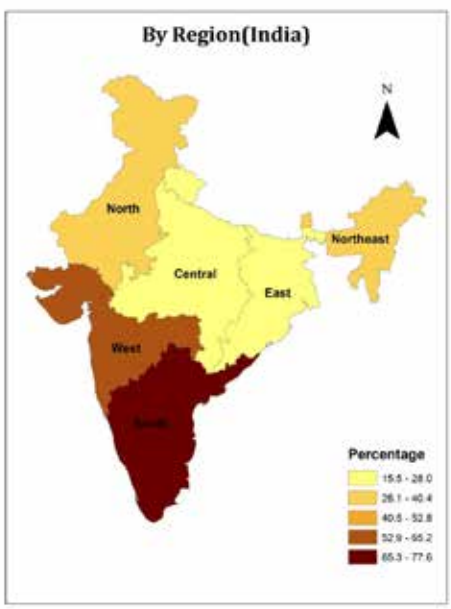

Figure 3(b)

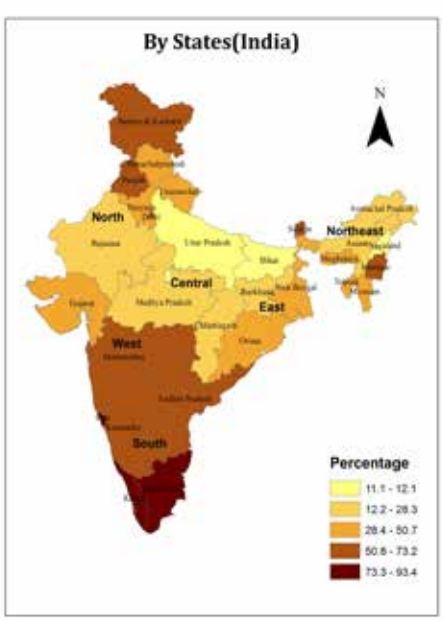

Figure 3 (c)
Figure 3.Utilization of at Least Four Antenatal Care Services

Figure 4 shows trend in receiving at least one antenatal care visit and at least four ANC visit during their last pregnancy in all the three rounds of NFHS. Result shows that utilization of any ANC visit has increased between 1992 to 2006 from 64.2 % to 76.5 % , during the same period at least four visits also increased from 27.9 % to 37.0 %. Two regions i.e., southern and western, in all round of NFHS, showing better performance in both indicators receiving at least one antenatal care visit and at least four ANC visit compare to national level. Northeast, central and eastern region women are less receiving both the indicators as compared to national average in all three rounds of survey. Further, we have observed that only northern region is below, national average antenatal care services for first two rounds of NFHS, whereas in last round NFHS-3 showed better performance with respect to the national average (76.5%).

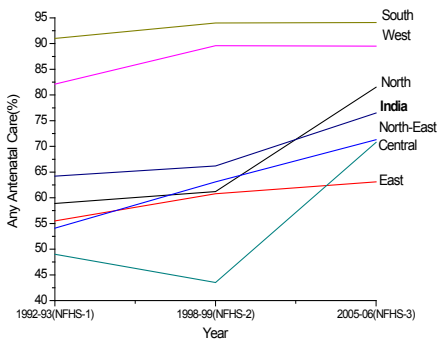

Figure 4(a)

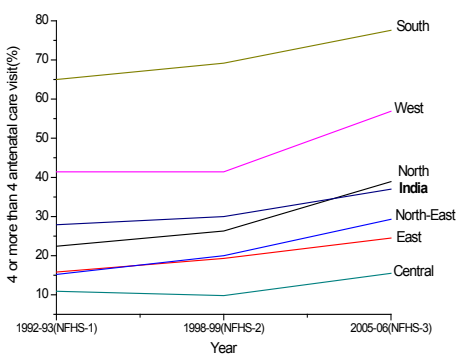

Figure 4(b)
Figure 4.Trend of receiving ANC services

Whereas Southern region is showing universal and consistent result in utilization of at least one antenatal care and at least four ANC visits in all three rounds of NFHS. Central region shows the worse and unsatisfactory level of performance in all three rounds of survey. Figure 4(b) illustrates that during the first round of NFHS (1992-93), level of receiving at least four antenatal care services was same in northeast (15.2 %) and eastern (15.8 %) regions, whereas in third round of NFHS (2005-06) Northeast (29.3 %) showed slightly better performance compare to eastern (24.5 %) region.

In all three rounds of survey, southern and western regions are showing better and stable situation in both indicators, because of past history of development and better infrastructure compared to other region.

Table 1 show that specific components of ANC for their most recent live births in last five years, for India and its different regions. The content of antenatal care provides an indication of its quality care received during pregnancy. Pregnancy complications are primary sources of maternal and child morbidity and mortality, and therefore teaching women about signs associated with pregnancy complication and appropriate action to take, as well as having measurement and test to identify any potential complication, are important components of antenatal care services.

Table 1: Percentage of ever married women receiving specific components of antenatal care by region, India, 2005–06

Antenatal care component	North	East	Northeast	Central	West	South	India
Weight	54.3	66.7	57.1	33.1	84.3	90.1	63.3
Blood pressure	58.9	66.2	62.2	31.6	83.3	92.4	63.9
Urine sample taken	59.2	50.9	46.2	29.5	77.1	90.3	58.2
Blood sample taken	60.1	55.3	44.7	29.6	79.6	90.3	59.6
Told about pregnancy complication	26.7	25.0	23.0	15.5	26.0	33.8	24.6
Told where to go for pregnancy complication	45.5	36.4	32.2	26.2	50.5	57.6	41.2
Given or brought Iron tablets or syrup	73.4	78.7	77.3	74.0	86.7	85.4	79.3
Abdomen examined	70.8	68.4	68.7	52.5	86.9	92.5	72.3
Told about expected date of delivery	48.0	51.9	59.6	24.7	69.3	85.8	54.1
Advised to deliver in hospital	47.3	52.0	53.1	28.3	65.1	80.2	52.9
Advised on pregnancy nutrition	60.0	70.9	62.7	43.0	74.9	89.2	66.1
N	3933	6358	1170	8135	4648	6371	30615

Less than one-fourth (24.6%) of women who received antenatal care were informed about pregnancy complications in India whereas this percentage was extremely low in central region less than 16% only. Southern (33.8 %) and western (26.0%) regions perform better than average of India (24.6%).However other preventive treatments, laboratory tests and other problems where ranging from 64 % for a blood pressure measurement to 25% for pregnancy complications. In this region, most women who receive antenatal care had their blood pressure measured. The practice of taking urine, information on expected date of delivery, advised to deliver in hospital and blood samples is less common in India and its region except in south (90 %) and western region (77 %). Southern region's performance is better due to better-quality of infrastructure, health facility and higher level of literacy rate.

Table 2 shows at least four antenatal care visit by background characteristics of women. Women's education consistently showed a positive association with at least one antenatal care visit in all the regions. Interestingly, in all regions antenatal care visits were higher among non-working women. A higher wealth index was associated with greater likelihood of receiving at least four antenatal cares in all regions. Antenatal visit increased with husband's education in all six regions. Women who belonged to other religion (53%) are better than Hindu (37.2%) and Muslim (31.3%) women. Almost all regions, Hindu women are visiting more for at least four antenatal care visits than Muslim women except North region, this gap between Hindu and Muslim is found higher in northeast region (28.1 point). In central region both Hindu (15.7 %) and Muslim (12.6%) women reported poor status about utilization of at least four antenatal care visit. Other caste (49 %) and OBC (35%) women are performing better in utilization of visiting for at least four as compare to SC/ST women (27%). In central region visiting for antenatal care is lower in both SC/ST (10 %) and other caste (27%) household, same pattern is followed in Western (41%) and Southern (68%) region. Further, we observed that there was not much variation found for at least four antenatal care visits with respect to caste and religion.

Richest wealth quintile (77.4%) and higher educated mother (81%) where utilizing more antenatal care facility as compared to lowest wealth quintile (12.1%) and no educated (16%) mother respectively. These patterns are found in all the regions of India. In southern region gap between higher wealth and lowest wealth quintile for utilization of antenatal services is lowest compare to all region of India and same pattern is found between higher educated and not educated women. In all the regions, exposure to media was having a positive relationship with respect to at least four antenatal care visits than those who did not. Urban women (62.4%) were visiting more for antenatal care as

Table 2: Percentage of ever married women who received at least four antenatal visits according to background characteristics, by region, India, 2005-06.

Background characteristics	South		West		Central		Northeast		Eastern		North		India	
	%	N	%	N	%	N	%	N	%	N	%	N	%	N
Age group of women														
15-19	73.5	448	41.6	346	12	747	24.9	112	22.2	1082	26.5	249	30.1	2984
20-24	76.7	2484	56.4	1858	16.8	3522	30.3	470	28.2	3417	38.0	1524	39.4	13275
25-34	79.5	3327	59.8	2643	17	5675	30.1	792	25.2	4620	42.8	2554	39.2	19611
35-45	72.0	436	50.6	265	8.5	1459	26.8	238	10.4	923	27.1	458	22.6	3779
	chi2(3) = 22.27Pr = 0.000		chi2(3) = 82.32Pr = 0.000		chi2(3) = 123.23Pr = 0.000		chi2(3) = 39.49Pr = 0.000		chi2(3) = 65.30Pr = 0.000		chi2(3) = 59.21Pr = 0.000		chi2(3) = 383.25Pr = 0.00	
Religion														
Hindu	76.5	5,459	55.6	4,118	15.7	9,483	38.3	868	26.9	7685	35.2	3657	37.2	31274
Muslim	81.8	853	63.4	692	12.6	1,814	10.2	395	17.2	2080	40.9	643	31.3	6480
Other	84.0	380	58.1	296	63.5	89.0	28.7	344	13.9	265	64.0	483	53.4	1859
	chi2(2) = 32.4929 Pr = 0.000		chi2(2) = 52.9270 Pr = 0.000		chi2(2) = 127.1459 Pr = 0.000		chi2(2) = 378.9433 Pr = 0.000		chi2(2) = 70.6862 Pr = 0.000		chi2(2) = 98.3128 Pr = 0.000		chi2(2) = 37.9059 Pr = 0.000	

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Wealth index														
Poorest	55.0	696	20	560	5.9	3,631	5.3	334	10.2	3,631	7.9	707	12.1	9,563
Poorer	63.0	1,139	31	741	8.5	2,875	16.1	507	16.6	2,664	15.4	663	21.2	8,592
Middle	73.7	1,726	45.8	947	13.1	2,029	33.9	386	29.1	1,687	25.3	989	36.6	7,767
Richer	86.5	1,714	63.2	1,307	22.1	1,591	55.1	232	43.9	1,306	44	1,100	53	7,253
Richest	94.4	1,417	83.9	1,553	54.6	1,273	75.4	150	77.9	751	73.2	1,322	77.4	6,468
	chi2(4) = 585.5891 Pr = 0.000		chi2(4) = 898.2862 Pr = 0.000		chi2(4) = 2215.05 Pr = 0.000		chi2(4) = 1427.71 Pr = 0.000		chi2(4) = 1433.72Pr = 0.000		chi2(4) = 1101.09 Pr = 0.000		chi2(4) = 8558.78 Pr = 0.000	
Media Exposure														
No	50.3	941	26.7	1094	6.3	4070	10.2	422	11.2	4070	13.5	1628	14.2	12225
Yes	82.1	5754	65.1	4018	20.7	7332	36.1	1190	33.6	5973	52.0	3156	47.1	27423
	chi2(1) = 391.4385 Pr = 0.000		chi2(1) = 459.1463 Pr = 0.000		chi2(1) = 578.7032 Pr = 0.000		chi2(1) = 415.1208 Pr = 0.000		chi2(1) = 559.5331 Pr = 0.000		chi2(1) = 590.7182 Pr = 0.000		chi2(1) = 3649.79 Pr = 0.000	
Caste														
SC/ST	68.4	1609	41.4	1379	10.3	3558	29.6	588	19.9	3037	26.4	1513	27.5	11684
OBC	79.0	3703	55.3	1599	13.7	5371	39.2	252	16.4	3503	28.3	1448	35.4	15876
Other	85.7	1188	68.3	2082	27.1	2469	34.5	455	39.4	2997	55.8	1650	49.5	10841
	chi2(2) = 97.8293 Pr = 0.000		chi2(2) = 159.1164 Pr = 0.000		chi2(2) = 464.6020 Pr = 0.000		chi2(2) = 183.3661 Pr = 0.000		chi2(2) = 400.9476 Pr = 0.000		chi2(2) = 305.1405 Pr = 0.000		chi2(2) = 1442.12 Pr = .000	
Employment														
No	82.4	4203	65.3	3075	18.3	6940	30.4	1123	30.7	6426	46.4	2932	42.2	24699
Yes	69.4	2489	44.1	2035	11.2	4459	26.7	488	13.6	3616	27.0	1852	28.4	14939
	chi2(1) = 125.6475 Pr = 0.000		chi2(1) = 173.9225 Pr = 0.000		chi2(1) = 166.6485 Pr = 0.000		chi2(1) = 30.2394 Pr = 0.000		chi2(1) = 273.2888 Pr = 0.000		chi2(1) = 85.1691 Pr = 0.000		chi2(1) = 817.77 Pr = 0.00	
Type of place of residence														
Urban	86.1	2512	73.7	2274	33.5	2444	56.7	257	54.1	1675	62.7	1459	62.4	10621
Rural	72.5	4183	43.3	2838	10.6	8959	24.1	1354	18.6	8367	28.5	3325	27.7	29026
	chi2(1) = 175.8676 Pr = 0.000		chi2(1) = 270.8431 Pr = 0.000		chi2(1) = 1278.9493 Pr = 0.000		chi2(1) = 500.7714 Pr = 0.000		chi2(1) = 675.1501 Pr = 0.000		chi2(1) = 330.2193 Pr = 0.000		chi2(1) = 3573.82 Pr = 0.000	
Husband's education														
No education	59.5	1514	21.8	726	5.3	3521	12.6	422	10.4	3613	17.3	1176	17.1	10972
<5 years complete	72.6	492	38.7	396	12.1	595	18.8	253	21.0	1027	22.5	177	30.1	2940
5-7 years complete	75.7	1169	52.3	792	12.9	1624	23.0	221	25.0	1458	30.9	761	35.8	6025
8-9 years complete	83.8	948	58.5	1000	14.1	2117	31.7	331	31.5	1390	35.6	835	38.1	6621
10-11 years complete	86.0	1110	66.8	964	17.7	1307	47.7	145	29.7	1043	51.3	819	48.8	5388
12 or more years	90.4	1399	78.0	1214	35.8	2106	65.3	207	54.9	1331	66.1	998	61.9	7255
	chi2(5) = 432.5471 Pr = 0.000		chi2(5) = 516.4593 Pr = 0.000		chi2(5) = 1103.6204 Pr = 0.000		chi2(5) = 928.8830 Pr = 0.000		chi2(5) = 861.6758 Pr = 0.000		chi2(5) = 647.5737 Pr = 0.000		chi2(5) = 4510.23 Pr = 0.00	
Respondent's education														
No education	56.4	1879	29.2	1399	6.7	6931	12.5	556	9.2	5621	20.3	2441	16.0	18827
<5 years complete	73.4	530	42.8	379	15.8	520	19.2	256	27.2	960	26.6	173	35.1	2818
5-7 years complete	80.5	1258	54.3	1010	17.6	1350	26.7	247	37.1	1344	41.0	632	44.9	5841
8-9 years complete	86.2	1012	69.2	900	21.9	1188	40.1	322	45.1	986	54.6	481	53.0	4889
10-11 years complete	88.8	943	75.8	649	37.7	498	60.1	106	52.5	602	65.6	454	67.5	3252
12 or more years	95.3	1072	87.0	773	59.2	914	75.3	125	80.4	530	82.9	602	81.0	4016
	chi2(5) = 671.3963 Pr = 0.000		chi2(5) = 756.1866 Pr = 0.000		chi2(5) = 2107.3377 Pr = 0.000		chi2(5) = 1111.8617 Pr = 0.000		chi2(5) = 1461.7979 Pr = 0.000		chi2(5) = 957.4265 Pr = 0.000		chi2(5) = 7983.00 Pr = 0.000	
Birth Order														
1	86.6	2147	68.0	1574	26.3	2283	44.8	489	41.5	2691	51.9	1270	52.8	10454
2-3	77.2	3830	58.3	2669	18.5	4507	28.9	677	26.3	4281	43.5	2225	42.0	18189
4-5	56.3	609	34.8	662	9.4	2647	14.9	287	8.8	1919	21.8	823	17.4	6947
6+	32.0	110	23.7	206	4.5	1966	9.1	161	4.5	1152	11.8	465	7.3	4060
	chi2(3) = 301.1786 Pr = 0.000		chi2(3) = 295.2877 Pr = 0.000		chi2(3) = 595.6701 Pr = 0.000		chi2(3) = 487.3411 Pr = 0.000		chi2(3) = 607.4600 Pr = 0.000		chi2(3) = 365.8645 Pr = 0.000		chi2(3) = 3633.16 Pr = 0.000	
Women autonomy														
Low	64.9	828	44.9	461	12.9	1877	18.0	148	22.5	1516	25.3	716	27.7	5546
Medium	76.2	2508	48.3	1828	14.9	4737	25.2	385	25.4	4506	36.0	2120	34.2	16084
High	81.7	3358	64.3	2822	17.2	4789	32.3	1079	24.3	4021	47.0	1948	42.3	18017
	chi2(2) = 90.1050 Pr = 0.000		chi2(2) = 134.4693 Pr = 0.000		chi2(2) = 91.7937 Pr = 0.000		chi2(2) = 45.6104 Pr = 0.000		chi2(2) = 6.7300 Pr = 0.035		chi2(2) = 76.8564 Pr = 0.000		chi2(2) = 438.055 Pr = 0.000	
Total	77.6	6696	56.8	5111	15.5	11403	29.2	1614	24.5	10043	38.9	4783	37.0	39650

compared to rural women (27.7%).Urban - Rural differential was found low for utilization of antenatal care services for southern (13.6 point) and western regions (20 point) which is less than the national average (35 point). Birth order is significantly associated with visiting any health facility for ANC services. Percentage of pregnant women who visiting any health facilities for four ANC visit decreases with increasing number of birth order. Similar results are seen in all regions of India.

Regression analysis

Table 3 shows the result of binary logistic regression analysis for visiting any health facility for at least four antenatal

care visits during their last pregnancy. Result of regression analysis shows that wealth quintile, place of residence, education of mother are main predictor of utilization of at least four antenatal care visits for their last pregnancy.

Table: 3: Binary logistic regression showing variables influencing the odds of receiving four antenatal care, India, 2005-06.

Background characteristics	South	West	Central	Northeast	East	North	India
Age of Respondent(in yr)							
15-19.®							
20-24	1.13	1.65***	1.36**	1.34**	1.30**	1.30	1.29***
25-34	1.51**	2.34***	1.80***	1.41**	1.79***	1.84***	1.69***
35-45	1.49*	3.55***	1.59**	1.52**	1.94***	2.2***	1.98***
Religion							
Hindu.®							
Muslim	1.13	0.91	0.85*	0.60***	0.84	1.45***	0.92**
Other	0.90	1.50**	2.39***	0.45***	0.39***	1.90***	0.69***
Wealth index							
Poorest.®							
Poorer	1.06	1.24	1.09	2.86***	1.19	1.62**	1.43***
Middle	1.34**	2.09***	1.30**	5.37***	1.65***	1.89***	2.17***
Richer	1.79***	2.53***	1.77***	8.47***	2.10***	2.7***	2.87***
Richest	3.18***	4.48***	3.44***	16.41***	3.44***	4.28***	4.82***
Media Exposure							
No.®							
Yes	1.70***	1.63***	1.29***	1.42***	1.29***	1.53***	1.56***
Caste							
SC/ST.®							
OBC	1.11	1.22**	0.94	1.04	0.64***	0.97	1.15***
Other	1.07	1.64***	1.03	1.27***	1.22**	1.10	1.19***
Employment							
No.®							
Yes	0.95	0.83**	1.23***	0.99	0.90	0.96	1.03
Place of Residence							
Urban.®							
Rural	0.76***	0.88	0.43***	0.80***	0.57***	0.64***	0.65***
Birth Order							
1.®							
2-3	0.54***	0.60***	0.61***	0.59***	0.50***	0.71***	0.62***
4-5	0.30***	0.36***	0.41***	0.42***	0.21***	0.46***	0.30***
6+	0.14***	0.22***	0.25***	0.42***	0.15***	0.31***	0.17***
Husband's education							
No education.®							
<5 years complete	1.18	1.29	1.46**	0.85	1.23	1.19	1.13**
5-7 years complete	1.21	1.69***	1.54***	0.81*	1.28**	1.28**	1.15***
8-9 years complete	1.42***	1.33*	1.33***	0.99	1.21	1.18	0.94
10-11 years complete	1.44***	1.43**	1.28**	0.89	1.06	1.16	0.95
12 or more years complete	1.13	1.68***	1.42***	1.14	1.23	1.29*	0.89**
Respondent's education							
No education.®							
<5 years complete	1.62***	1.2	1.63***	1.03	1.95***	0.91	1.61***
5-7 years complete	1.85***	1.26*	1.68***	1.19	2.45***	1.49***	1.87***
8-9 years complete	2.15***	1.64***	1.88***	1.37***	2.40***	1.75***	2.11***
10-11 years complete	2.05***	2.08***	2.84***	1.68***	2.61***	2.15***	2.99***
12 or more years complete	3.10***	2.83***	4.05***	2.12***	5.47***	3.11***	3.89***
Women autonomy							
Low.®							
Medium	1.30**	0.87	1.38***	1.02	1.31***	1.05	1.23***
High	1.77***	1.29*	1.49***	1.50***	1.46***	1.22*	1.53***

.P values- *** Significant at 1 percent; ** Significant at 5 percent; * Significant at 10 percent.
®- Reference category.

Mother's education and wealth index is positively associated with at least four antenatal care visits not only in India but also at the regional level. Higher educated mother and father, and women belonging to higher wealth quintile are more likely to receive at least four antenatal cares during their last pregnancy. Women who received 12 or more year's education (OR=3.89; p<0.00) are more likely to visit for at least four ANC services compare to illiterate women. One interesting finding is that, likelihood of receiving at least four antenatal care visits increases with increase in wealth index and it is least for the women belonging to poorest wealth quintile in all the regions of India. These results were consistent with the finding of bi-variate analysis. Higher gap of receiving antenatal care between poorest and richest was found in Northeast region where richest women (OR=16.41; p<0.00) were more likely to receive at least four antenatal cares as compared to the poorest women, but lowest gap was found in southern region (OR=3.18; p<0.00).

Age of mother had a positive effect on utilization of at least four ANC visit when including birth order with other variables. In India, women in older age group (35-45) (OR=1.98; p<0.00) were more likely to visit for at least four antenatal care services. Birth order has a strong negative effect on visit of at least four ANCs in India as well as in all six regions of India. In India, women from rural (OR=0.65; p<0.00) are less likely to receive at least four ANC visit compared to urban counterpart and same pattern are followed by all regions. Interesting observation is

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that Muslims are less likely to receive at least four antenatal cares compared to Hindu in all regions except Northern and southern regions whereas in southern region it is not significantly associated. Difference between Hindu and Muslim religion from northeast region about receiving antenatal care services is higher and Muslim women are 40% less likely to receive antenatal care compared to Hindu religion. Women with higher (OR=1.53; p<0.00) and medium (OR=1.23; p<0.00) autonomy status are more likely to have four or more ANC visits as compared to the low autonomy women. Women's autonomy is significantly associated in the North, northeast, western region and central region. Exposure to mass media was significantly associated in all regions and it was highest in the southern region where women are 1.7 times more likely to have four or more ANC visit. Women belonging to other caste (OR=1.19; p<0.00) and OBC (OR=1.15; p<0.00) are more likely to have four or more visits of ANC as compared to SC/ST households in India.

Table 4 show the logistic regression for visiting at least four ANC services after controlling socioeconomic and demographic characteristics. Result show that Pregnant

Table: 4 Logistic regressions showing Effect of region on visiting at least four ANC services after controlling socioeconomic and demographic characteristics.

Region	Adjusted Odds Ratio*	Std. Err.	[95% Conf. Interval]
North®	1.00	-	-
East	1.07	0.05	0.97 - 1.18
North-east	1.04	0.05	0.95 - 1.15
Central	0.59***	0.03	0.54 - 0.64
West	2.07***	0.11	1.87 - 2.30
South	7.16***	0.39	6.44 - 7.97

* Results have been mutually adjusted for age, sex, birth order, mother's age, education , exposure to mass media, wealth index, religion and caste.®- Reference category.
P values- *** Significant at 1 percent; ** Significant at 5 percent; * Significant at 10 percent.

women from South (OR=7.16; p<0.00) and western (OR=2.07; p<0.00) region are more likely visited for at least four ANC compare to northern area. Eastern and northeast region is slightly better to north region, but result is not significant. Central region is 41 percent less likely to visit for at least four ANC compare to northern region.

Discussion

Results show that India is performing better as compared to neighbouring SAARC countries, whereas at the world level, it is still far away in reaching its goal in achieving utilization of antenatal care services from world and South-East Asian level. Study has found that utilization of at least four ANC visits has gradually increased between 1992 and 2006 from 27.9% to 37.0%. Nevertheless, utilization of ANC services among Indian women remains low. Further, this study has identified determinants which are women's education, caste, religion, economic status of household and place of residence that have significant influence on the utilization of ANC services. Main determinants of at least four ANC visit are wealth quintile, place of residence, and education of mother. Higher level of education increases the utilization of antenatal care services for at least one [4] and four antenatal care visits [1, 16]. With increasing level of education, the awareness [20] and consequences [19] of not utilizing the services among the women increased. It is possible that the less educated women are not effectively adopting information regarding utilization of ANC services compare to more educated women.

Wealth Index is positively associated with the four or more antenatal visits. Utilization of antenatal care services increases with increase in wealth quintile [1, 19]. Women belonging to higher wealth quintile are more likely to receive at least four antenatal cares during their last pregnancy. There exists a gap in utilization of services, among poor and rich households this may be due to the low priority assigned to health seeking behaviour with respect to other basic requirements of day to day life [22]. Some other studies revealed that higher wealth quintile family have more capacity for affordability and also have greater exposure in accessing relevant information and knowledge regarding issues related to maternal health compare to poor wealth quintile households [16]. Utilization of antenatal care services is higher in urban area than in rural area [1] due to more accessibility [17, 18] and availability, and awareness of health care services in urban areas [16, 19]. Report of Rural Health Statistics in India (2012) shows that 4 %, 36.5% and 23.1% of Primary Health Centre (PHC) which is the first contact point between village community and the Medical Officer, are working without doctor, lab technician and pharmacist respectively in rural India [31, 37, 38]. Shortage of lab technician and pharmacist may force pregnant women to depend on costly private sector's lab for diagnosis which can be not affordable for women who belong to poor family. Another reason is that rural women are more likely to receive health services from traditional health provider compare to urban counterpart. Caste is also playing an important role in utilization of health care facilities. Upper and other caste's women are more utilizing the health facility as compare to backward caste (SC/ST). Women belonging to lower caste do not utilize the antenatal care services because of their poor socioeconomic status in Indian society as well as lack of awareness [36]. Another reason may be that mother from higher caste are also more likely to be aware of the benefit of obtaining ANC services through easily accessibility of different sources of mass media such as television, and newspaper than their counterparts from lower caste group (SC/ST). Moreover, Hindu women are more likely to utilize antenatal care services as compare to Muslim women. The reason for not utilization of services among Muslim Women is because of their lower social status in society [5, 21] and lack of exposure for health care services as compared to their Hindu counterpart. Women's autonomy is positively associated with utilization of antenatal care services. One interesting finding is that higher parity women are utilizing less ANC services than lower parity women. The results are consistent with other studies [1]. This may be because of the reason being that the expectant mother thinks that she knows enough to take care of subsequent pregnancies from earlier experience of child birth [19]. Another reason may be that higher parity mother faces more problem receiving health facility with small children [4]. Women belonging to higher autonomy are more likely to visit for antenatal check-up as compare to lower autonomy women. Southern region of India is better performing in utilization of antenatal care facility as compare to other regions as well as at the global level because of their better demographic indicators [15, 22]. Another reason is that Southern region is more economically developed and has better infrastructure than other regions [5]. One interesting point is that in southern region, inequality of utilization of ANC services are still remain between poor-rich and lower to higher educated women like other region, but gap between these groups in southern region is lower compare to other region. Overall southern region is performing better due to higher percentage of urbanization,

high educational level, lower level of poverty and better quality of services [38]. In Southern region, Kerala and Tamil Nadu are performing well and these states also have higher rank in report of Human Development Index (2011) [28]. Women from southern region are showing better autonomy status compare to other regions. Central region and eastern region of India is far away from average utilization of ANC services because these regions have higher proportion of illiterate and poor person; and Uttar Pradesh in central region, Arunachal Pradesh in Northeast and Bihar in Eastern region are worst performing states. These (central, east and north) backward regions cover all the BIMARU (sick) states which are poor performing in human development indicator [27, 28]. Northeast region is performing poor due to lack of accessibility and affordability of health facility. It is due to the reason that Muslim migrant who come for employment from neighbouring country Bangladesh to neighbouring states of India (Northeast) and most of them are illiterate and belong to poor households [32, 33, 34, 35]. This possibility is supported by logistic regression result where it shows that Muslim pregnant women from northeast region are less likely to visit for at least four ANC services compare to other religion and the gap is highest in India.

Conclusion

All parts of India except southern region, in context of percentage of receiving ANC are below to world average and steps should be taken to necessitate in improvement of quantity and quality of services during pregnancy period. Wealth index and education are the main significant predictors for under utilization of ANC services in India as well as in all six regions. Higher educated and richest women are more likely to receive antenatal care services in all regions. Religion, exposure to mass media, birth order, age of women and place of residence are other predictors of utilization of ANC services. Government's policy should immediately focus on poor and uneducated rural women and also it should reduce the direct and indirect cost of visiting health facility. Providing financial support to mother from poor household will be helpful to reduce their out-of-pocket expenses for both medical and transportation costs. Need of continuous strong monitoring and evaluation system is required to assess the effective result. Policy should also focus on encouraging women to complete education to at least 12 or more years. Government should make effort in strengthening the campaign on the use of maternal health care services, especially on the consequences of antenatal care visit. This can be done through mass media exposure especially in the rural area, since such areas are not likely to have adequate access to the mass media. There is a need to strengthen education especially for the mothers who had the experience of child birth on the need to use adequate ANC for each pregnancy. Such mothers from the study tend to use less ANC and maternal health services in general. Worse performing regions in India are Northeast, Central and Eastern region where quality and quantity of receiving antenatal service are poor. Southern region is the only region in India, which is above the world level average regarding utilization of at least four ANC visit. If Indian government have limited resources and desire for instantaneous result to reduce maternal death then it should especially focus on targeted rural population of following states- Uttar Pradesh, Bihar, Rajasthan and Arunachal Pradesh from central region, eastern region, north and northeast region, respectively.

Limitation of the Study

In this study, we have focused on demand side barriers across the India as well as studied the change overtime, but not focused on supply side barriers because of the limitation of data.

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