

# **Title: Are the poor catching up with the rich in utilizing maternal health services? Evidence from India**

**Sohini Paul<sup>1</sup>**

**Abstract:** India launched the National Rural Health Mission (NRHM) in 2005 to improve maternal and child health by providing good quality health services to all, especially deprived sections of society, to reduce inequality in access to health services. With the backdrop of NRHM, we analyzed the extent to which the utilization of maternal health care services in the three stages of the continuum of care – antenatal care, care during child delivery and postnatal care –has improved among the poor vis-à-vis the rich in India, and the corresponding narrowing down in inequality in the period 2006-16. Data from the 3<sup>rd</sup> round of the National Family Health Survey (NFHS); 2005-06, capturing the pre-NRHM period and the 4<sup>th</sup> round of NFHS 2015-16, capturing the post-NRHM era ten years after the implementation of the flagship program, are used for the analysis. We estimated absolute as well as relative measures of inequality, the absolute gap and coverage ratio between the poor and the rich, the slope index of inequality and the concentration index. Our findings show that maternal health care coverage increased significantly among the poor for all components of maternal health care services. Even so, the extent of utilization of services remains significantly lower among the poor in 2015-16 compared to the coverage among the rich in 2005-06. Although inequality declined at the national level over the decade, it still persists. High equity has been achieved in using skilled birth attendance during child delivery and institutional delivery during 2015-16; however, inequality continues to be high for antenatal care indicators including consumption of iron and folic acid supplements for at least 100 days, receipt of four or more antenatal check-ups and comprehensive health check-ups at least once during antenatal visits and receipt of first check-up in the first trimester.

Key words: Maternal health care, India, National Rural Health Mission, Inequality

---

<sup>1</sup>: Senior Program Officer, Population Council, Delhi, Ph: +9111 24642901/02, +91-9811756066; email id: [spaul@popcouncil.org](mailto:spaul@popcouncil.org);

## Introduction

India has been experiencing high maternal death rates for a long time. Although the maternal mortality ratio has declined from 301 in 2001-03 to 130 per 100,000 live births in 2014-16 (Office of Registrar General 2006; 2016), India is yet to achieve the National Population Policy's goal of reducing the maternal mortality ratio to 100 per 100,000 live births by 2010 or the Millennium Development Goal of 109 by 2015. The nation still accounts for 15% of global maternal death (Say et al, 2014). Inequality in maternal health outcomes and the utilization of maternal health care services has also been a serious concern in India as it has been in other developing nations (Houweling et al, 2007; Boerma et al, 2008; Barros et al, 2012; Countdown Report, 2015; Paredes, 2016; Wong et al 2017). Earlier studies showed that wide economic and socio-demographic inequalities existed in maternal and child health (MNCH) outcomes as well as in utilization of MNCH services (Jejeebhoy and Santhya, 2014; Paul et al., 2011) in India. Until 2006, non-poor mothers were more likely to benefit from maternal health care services than poor mothers (Mohanty and Pathak 2009; Pathak, Singh, Subramanian, 2010). There was a slow reduction at the rate of 1% per year in the gap between the rich and the poor in utilizing maternal health care during the period 1992-2006 (Boerma et al, 2008).

To improve the maternal health scenario in India by providing accessible, affordable, accountable, and good quality health services to all, including the poorest and those in the most remote areas of the country, the National Rural Health Mission (NRHM) was launched in 2005 (MOHFW 2005). It marked a clear commitment to improving MNCH situation by revamping several existing schemes and introducing new schemes such as the *Janani Suraksha Yojana*, a conditional cash transfer scheme intended to encourage institutional delivery. The government also introduced the Accredited Social Health Activists (ASHAs) scheme to serve as a link between the community and public health system. The NRHM was subsequently restructured as the National Health Mission to address the health needs of the urban population as well. Further, the national Reproductive, Maternal, Newborn, Child Health + Adolescent (RMNCH+A) initiative has proposed a continuum of care model that focuses on the pre-pregnancy stage shortly after marriage and extends to the child care phase of the life cycle (MOHFW 2013).

The utilization of maternal health care services increased during the period from 2006 to 2016 after the implementation of the NRHM/NHM (IIPS and ICF 2017). However, only a few studies have examined how much of the increase in utilization was because of increased utilization by the poor due to the limited availability of data at the national level. For example, Joe et al (2018) found that inequality in institutional birth decreased significantly at the national level during 2004-2014. Other studies focused on the use of selected maternal health care services covering antenatal care or child delivery care in specific states or regions. Using different rounds of District Level Health Survey data, Vellakkal et al (2017) examined whether inequality in antenatal care and child delivery care decreased after the adoption of NRHM in eight high focused states and seven north-eastern states where socio-economic inequality was high. On account of excessively high fertility and mortality indicators, the Government of India declared the following states – Jharkhand, Uttar Pradesh, Bihar, Chhattisgarh, Uttarakhand, Rajasthan, Orissa and Madhya Pradesh – accounting for 48% of Indian's population as high focus states. The study found that coverage and equity of institutional delivery and antenatal care (ANC) services increased moderately in most of these states during 2011-12 compared to the pre-NRHM era (before 2006). Another study focusing on the same set of states except the north-eastern ones showed similar findings; institutional birth increased from 20% to 49% in the high focus states during 2005-2010; however, inequality persisted (Randive et al 2013). The decline in inequality in institutional delivery is higher than in antenatal care in the early post-NRHM period – 2007-08. Equity in the utilizations of these services improved further during 2011-12, although the extent varied across different states (Vellakkal et al 2017). Ray et al (2018) found that inequality persisted in Haryana in the use of antenatal care services as well as institutional delivery in 2013. Antenatal care services here included four or more antenatal checkups, or receiving two or more tetanus toxoid vaccine during pregnancy, or consumption of 100+ iron folic acid (IFA) tablets or syrups during pregnancy.

Although a limited number of available studies examined how the pattern of inequality in selected maternal health care services – either antenatal care or institutional delivery – changed after the adoption of NRHM/NHM, a comprehensive analysis of inequality focusing on all three stages of the continuum of care is still missing at the national level. It remained a little studied topic in India due to the unavailability of nationally representative data after 2006. However, it is an important question that needs to be answered given the low health sector expenditure as a proportion of gross domestic product (GDP) in this country. We hypothesize that inequality in the use of maternal health care services declined over the past decade after the implementation of NRHM. This paper, therefore, aims

to examine the extent to which the use of maternal health care services has improved among the poorest vis-à-vis the rich in India, the extent to which economic inequalities in access to MNCH services have narrowed over time, and the components of MNCH care for which there has been a reduction in inequality of access between the years 2006 (pre-NRHM/NHM) and 2016 (post-implementation of NRHM/NHM). Comparing the recently published fourth round of National Family Health Survey (NFHS) data with the third round conducted in 2006 gave us an opportunity to answer the research question.

## **Methods**

We have estimated inequality measures using two rounds of repeated cross-sectional surveys conducted at the national level capturing the pre- and post-NRHM era.

### **Study samples and data used**

The data for the analysis has been taken from the third and fourth round of National Family Health Surveys (IIPS and Macro International 2007; IIPS and ICF 2017), conducted in 2005-06 and 2015-16 respectively. NFHS employs the same sampling methodology and survey instrument as the internationally used Demographic and Health Surveys (DHS). These nationally representative surveys followed a multi-stage stratified sampling technique; while at the final stage, households were selected using the systematic sampling method. Like DHS, the NFHS is based on interviews of women aged 15-49 years and collect information on availability and accessibility of maternal health care services along with information on their demographic and economic characteristics. Detailed information of maternal health care services is available across the three stages of the care continuum –antenatal care, child delivery and post-natal care. During the surveys conducted, questions related to the trimester in which the mother first received ante-natal care, the number of times ante-natal care was received during pregnancy, the place of the child's birth and how soon the mother received a check up after the birth of the child were asked. NFHS 3 and 4 covered 124,385 and 699,686 women respectively. Our analysis focuses on MNCH care seeking for the last birth among ever married women aged 15-49 who had given birth in the five years before the survey. Thus, the final analytical sample size becomes 36,850 and 1,86,721 in 2005-06 and 2015-16 respectively. National level sampling weights are used to adjust for sample selection. The data analysis was performed with Stata 13.1 (StataCorp2013).

### **Key outcome variables**

We selected a comprehensive list of maternal health care services spanning the three stages of the care continuum. The antenatal care outcome variables consisted of the following: whether women had their first antenatal check-up in the first trimester of pregnancy; whether a pregnant woman received four or more antenatal check-ups; whether she received at least two doses of tetanus toxoid (TT2) injections; whether she consumed iron and folic acid supplements (IFA) for at least 100 days; whether a woman received comprehensive health checkups during pregnancy comprising five check-ups, and tests including measurement of weight and blood pressure, blood test, urine test and an abdominal examination. If a woman had undergone all five tests and checkups at least once, we assigned them a score of 5 and created a binary variable where women with score 5 are assigned the value 1, and the rest, zero. The outcome variables relating to child delivery included whether she had an institutional delivery and whether a woman had skilled birth attendance during delivery; the post-natal outcome variable was whether she received health check-up within 48 hours of child delivery. Like the ANC comprehensive health checkup binary, we created binary variables for each of the other outcome variables where a woman who receives the respective services is assigned a value 1, and the rest assigned a value of zero.

### **Analytical steps**

The sample households have been divided into five quintiles according to their wealth score; poorest (Q1), poor (Q2), middle class (Q3), rich (Q4) and the richest (Q5). We estimated the proportion of average coverage of three groups of women for each of MCH services indicators; (i) for all ever married women, (ii) for ever married women in the poorest quintile (Q1) and (iii) for ever married women in the wealthiest quintile (Q5); and compared those estimates across two time points; 2006 and 2016, capturing the pre- and post-NRHM era respectively, to understand how maternal health care services utilization has changed over the decade. We have reported the standard errors of coverage along with the average.

We also assessed the extent to which inequality in utilization of MNCH services had narrowed between 2005-06 and 2015-16 by using both absolute and relative measures of inequality. Two measures of absolute inequality are estimated – absolute gap in coverage between the poorest (Q1) and the richest (Q5) women and slope index of inequality (SII), which refers to the absolute difference in predicted values of an indicator between the poorest and the richest, estimated using logistic regression (Pamuk, 1985; Regidor, 2004). We also calculated measures of relative inequality – the ratio between Q5 and Q1 and concentration index (CI), which quantifies the extent to which a health service coverage indicator is concentrated among the poorest or the richest (Wagstaff et al 1991). The concentration

index is expressed in a scale of 0 to 1, where a value of 0 indicates perfect equality while a higher positive value indicates that health service is availed of more by rich women; 1 indicates perfect inequality. We reported standard errors of inequality along with values corresponding to the 95% confidence interval. All the estimation has been done using appropriate sample weights at the national level. We have presented concentration curves of the most equitable and inequitable maternal health care service indicators as well, which depicts a graphical presentation of the relative concentration of MCH service indicator against economic status.

## **Results**

A comparison of the coverage of maternal health care services in 2005-06 and 2015-16 shows that utilization has increased significantly since the launch of the NRHM, regardless of the indicator used (ref: Table1). However, the magnitude of improvements in coverage varied widely across different components. Services that are typically delivered in a health facility showed the highest increase over this period; for example, institutional delivery (increased from 41% to 81%), skilled birth attendance (increased from 50% to 83%), post-partum checkup within two days of delivery (36% to 65%) and receiving comprehensive tests and check-ups at least once during antenatal visits (35% to 64%). In comparison, services that are not necessarily provided in a health facility or that are typically dependent on the recipients' practices showed the smallest increase. These include receiving two doses of TT injections (76% to 83%), at least four antenatal check-ups (37% to 51%), first check-up in the first trimester (44% to 58%), and consumption of IFA supplements for at least 100 days (15% to 30%).

Despite improvements in the utilization of MCH services, our findings show that the coverage of several indicators remains limited. For example, just 30% of women had consumed IFA supplements for at least 100 days, 51-58% received an antenatal check-up in the first trimester or four or more antenatal check-ups, 64-65% received comprehensive check-ups at least once during their antenatal visits and postpartum check-ups within two days of delivery.

**Table 1: Coverage of maternal health care services (in %)**

MCH coverage indicators	Overall (%)		Difference (Round4-Round3)	Poorest (Q1)%		Difference (Round4-Round3)	Richest (Q5) %		Difference (Round4-Round3)
	2005-06	2015-16		2005-06	2015-16		2005-06	2015-16	
Proportion of women who had their first antenatal check-up in the first trimester	43.8 (0.3)	58.4 (0.1)	14.6 (0.36)*	22.8 (0.6)	37.6 (0.3)	14.8 (0.64)*	77.9 (0.6)	77.0 (0.4)	-0.9 (0.75)
Proportion of women who had at least four antenatal check-ups	36.9 (0.3)	51.2 (0.1)	14.25(0.35)*	12.08 (0.4)	24.9 (0.2)	12.91 (0.52)*	77.3 (0.6)	73 (0.4)	- 4.27 (0.76)*
Proportion of women who had received two doses of TT injections during pregnancy	76.2 (0.2)	82.9 (0.1)	6.68 (0.31)*	59.7 (0.6)	78.1 (0.2)	18.4 (0.74)*	92.3 (0.3)	87.6 (0.3)	- 5.31 (0.53)*
Proportion of women who took IFA supplements for at least 100 days during pregnancy	15.1 (0.2)	30.3 (0.1)	15.13 (0.28)*	6.05 (0.3)	14.43 (0.4)	8.37 (0.39)*	35.6 (0.71)	48.2 (0.48)	12.56 (0.86)*
Proportion of women who had received comprehensive health checkups at least once during	35.1 (0.31)	64.1 (0.15)	29 (0.35)*	9.7 (0.41)	34.7 (0.28)	25.05 (0.5)*	77.8 (0.63)	87.5 (0.28)	9.79 (0.69)*

their antenatal visits									
Proportion of women whose deliveries were attended to by a skilled health care professional	49.8(0.33)	82.7 (0.11)	32.9 (0.36)*	20.6(0.57)	64.4(0.28)	43.8(0.64)*	90.4(0.43)	95.9 (0.17)	5.52 (0.45)*
Proportion of women who had institutional delivery	41.4 (0.32)	80.9 (0.12)	39.5(0.34)*	13.19(0.48)	61.04(0.28)	47.85(0.56)*	85.57(0.52)	95.53(0.15)	10.26(0.54)*
Proportion of women who had received post-partum check-up within 2 days of delivery	36.2(0.31)	65.1(0.15)	28.89(0.35)*	13.6(0.48)	47.8(0.29)	34.24(0.56)*	73.2(0.44)	79.5(0.46)	6.28(0.78)*

**Note:** Values in the parentheses are standard errors. \*: p<0.01

During 2005-06, the coverage of maternal health care indicators hovered around 10% to 23% among women who belonged to the poorest households except in the case of two doses TT injection, which had the highest coverage of 60%. In the next ten years, coverage increased significantly among them, regardless of the indicator. Like the national trend, institutional delivery, use of a skilled birth assistant and post-partum checkup within two days of delivery increased by as much as 48%, 44% and 34% respectively. On the contrary, the increase in the coverage of consumption of iron and folic acid tablets at least for 100 days (6%-14%), at least four ANC visits (12%-25%) and first ANC visit in the first trimester (23%-38%) remained low.

Improvements in the utilization of services among rich women varied across different components. For example, while indicators such as consumption of IFA supplements for at least 100 days(36%-48%), receiving comprehensive health check-ups at least once during antenatal visits (78%-88%), institutional delivery (86%-96%), skilled birth attendance (90%-96%) and post-partum check-up within two days of delivery (73%-80%) increased significantly, indicators like first



antenatal check-up in the first trimester (96%-94%), four or more antenatal check-ups (77%-73%) and two doses of TT injection (92%-88%) decreased or remained unchanged during the inter-survey period.

### **Inequality in utilization of MCH services**

The findings presented in Table 2 show that inequality in the utilization of MCH services by household wealth status had declined between 2005-06 and 2015-16 for almost all indicators of MCH service coverage, regardless of the measure of inequality that we used. The only exception was the proportion of women who had consumed IFA supplements for at least 100 days during pregnancy, which recorded an increase in inequality as measured by indicators of absolute inequality, but a small decline was observed when measured by indicators of relative inequality.

Moreover, the magnitude of decline in inequality varied across indicators. The largest decline in inequality was observed for such indicators as institutional delivery (a decline of 33.65 percentage in SII and 24.76 points CI), skilled birth attendance (a decline of 36.31 percentage in SII and 19.42 points in CI), receipt of comprehensive check-ups at least once during antenatal visits (19.15 point decline in CI) and post-partum check-ups (20.45 point decline in CI). The smallest decline was observed for consumption of IFA supplements for at least 100 days (as per the slope index of inequality) and receipt of two doses of tetanus toxoid injection (as per the concentration index).

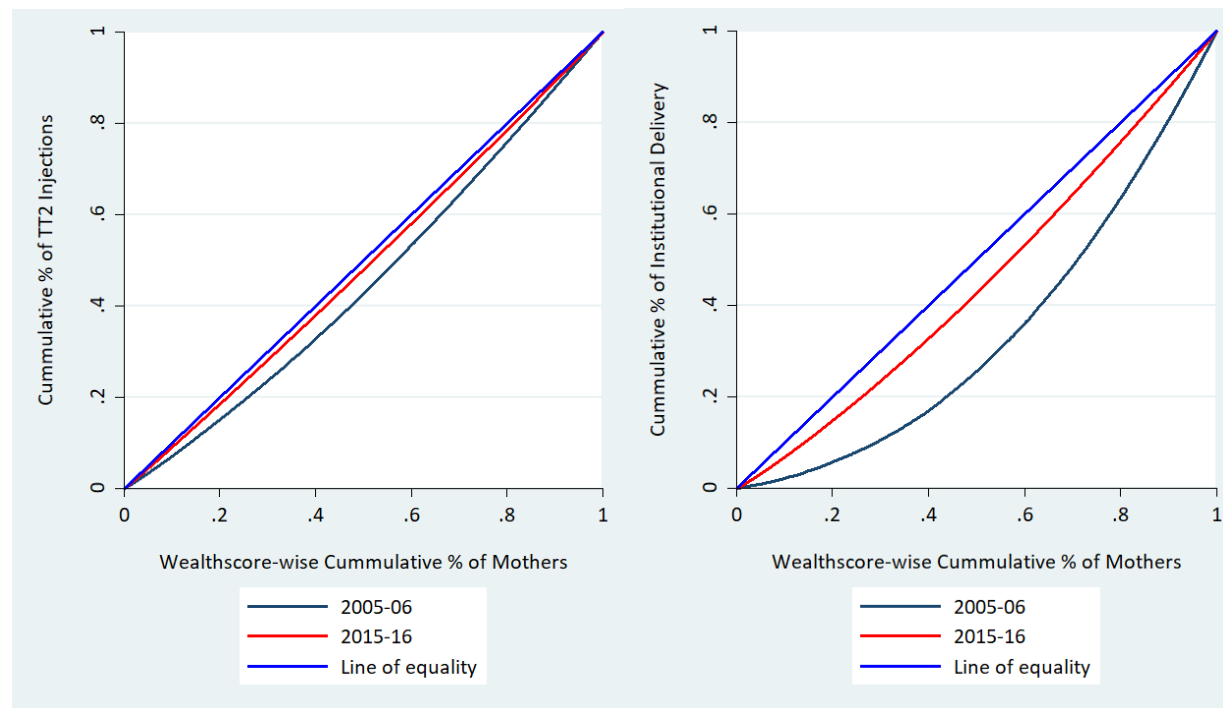
Table 2: Measures of absolute and relative inequality in utilization of maternal health care services between 2005-06 and 2015-16

	Absolute inequality				Relative inequality			
	(Q5-Q1) %		SII (in%)		Ratio (Q5/Q1)		CI*100	
	NFHS3	NFHS4	NFHS3	NFHS4	NFHS3	NFHS4	NFHS3	NFHS4
Proportion of women who had their first antenatal check-up in the first trimester	55.1	39.4	60.90 (1.06; 58.80-62.99)	45.97 (0.65; 44.69-47.25)	3.42	2.05	23.38 (0.59; 22.22-24.53)	13.16 (0.21; 12.75-13.57)
Proportion of women who had at least four antenatal check-ups	65.22	48.1	70.24 (1.00; 68.27-72.21)	55.52 (0.66; 54.21-56.83)	6.40	2.93	32.50 (0.73; 31.07-33.93)	19.33 (0.25; 18.84-19.82)
Proportion of women who had received two doses of TT injections during pregnancy	32.6	9.5	40.71 (1.44; 37.87-43.55)	10.35 (0.57; 9.22-11.49)	1.55	1.12	8.84 (0.37; 8.11-9.57)	1.98 (0.12; 1.76-2.21)
Proportion of women who took IFA supplements for at least 100 days during pregnancy	29.55	33.77	33.24 (1.19; 30.91-35.58)	40.07 (0.70; 38.68-41.46)	5.88	3.34	33.37 (1.15; 31.12-35.62)	21.71 (0.38; 20.98-22.45)
Proportion of women who had received comprehensive health checkups at least once during their antenatal visits	68.1	52.8	72.80 (1.01; 70.82-74.78)	60.70 (0.55; 59.60-61.79)	8.02	2.52	35.45 (0.79; 33.91-37.00)	16.30 (0.20; 15.91-16.69)
Proportion of women whose deliveries were attended to by a skilled health care professional	69.8	31.5	75.35 (0.86; 73.66-77.03)	39.04 (0.52; 38.01-40.07)	4.39	1.49	27.03 (0.57; 25.90-28.15)	7.61 (0.11; 7.38-7.83)
Proportion of women who had institutional delivery	72.38	34.49	76.35 (0.88; 74.62-78.07)	42.70 (0.53; 41.65-43.75)	6.49	1.57	33.30 (0.64; 32.05-34.55)	8.54 (0.13; 8.29-8.79)
Proportion of women who had received post-partum check-up within 2 days of delivery	59.6	31.7	64.86 (1.06; 62.76-66.95)	38.17 (0.67; 36.84-39.49)	5.38	1.66	30.56 (0.71; 29.16-31.96)	10.11 (0.19; 9.74-10.48)

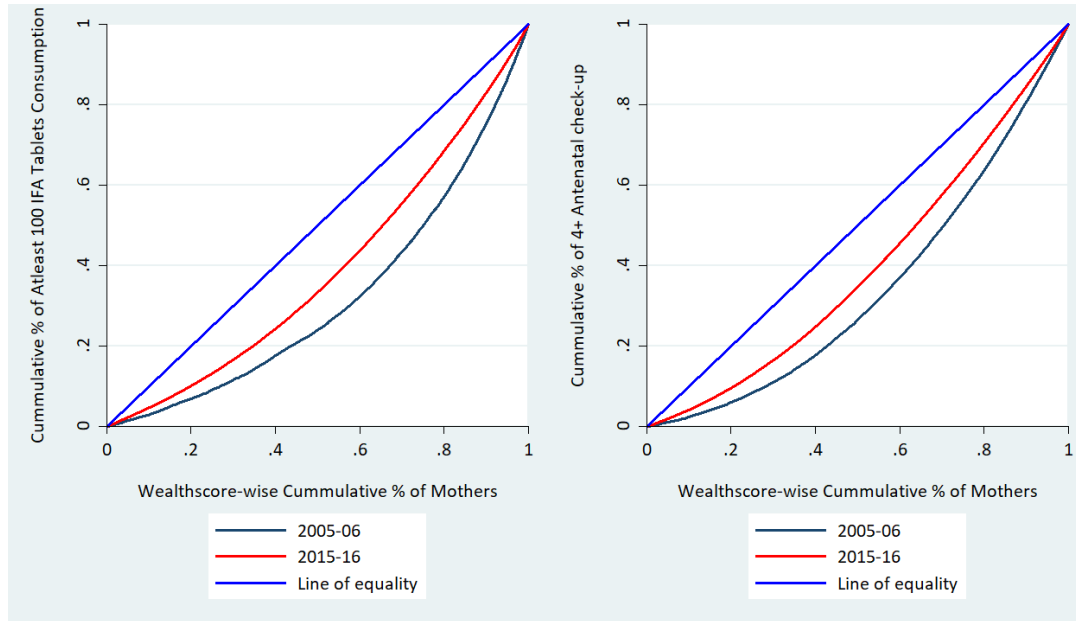
Note: SII: Slope Index of Inequality; CI: Concentration Index; values in the parenthesis refer to standard error and confidence intervals, respectively.

Despite declines in inequality during the inter-survey period, the findings show that inequality persists, suggesting that women who belonged to the wealthiest quintile had greater coverage than women who belonged to the poorest wealth quintile. The most equitable indicator was the receipt of two doses of tetanus toxoid injection according to all four measures of inequality in 2015-16. This is followed by skilled birth attendance, institutional delivery and post-partum checkup within two days of delivery as per relative measures of inequality. The least equitable indicators included consumption of IFA supplements for at least 100 days (according to relative measures of inequality), receipt of four or more antenatal check-ups and receipt of comprehensive health check-ups at least once during antenatal visits (as per all four measures of inequality) and receipt of first check-up in the first trimester.

Figure 1: Concentration curves for economic inequalities in utilization of maternal health care services; 2005-06 and 2015-16; (A) Concentration curve for TT2 injections; 2005-06 and 2015-16 (B) Concentration curve for institutional delivery; 2005-06 and 2015-16 (C) Concentration curve for iron and folic acid consumption for at least 100 days; 2005-06 and 2015-16 (D) Concentration curve for more than 4 ANC visits; 2005-06 and 2015-16



### A. TT2 injections



### C. 100+ IFA tablets consumption

### D. 4+ ANC check ups

The concentration curves presented in Figure 1 clearly reflect the fact that inequality declined for all the selected indicators during 2006-2016, although in varying magnitudes. The pro-rich bias in the utilization of MCH services decreased promisingly for institutional delivery and TT2 injections as concentration curves move closer to the line of equality in 2015-16 compared to 2005-06. In contrast, the consumption of iron and folic acid tablets and at least four ANC visits is still low among the poor as concentration curves remain significantly away from line of equality during 2015-16, even ten years after the implementation of NRHM.

## **Discussion**

Our paper extends the limited literature on coverage of utilization of maternal health care services in the post-NRHM era in India among poor vis-à-vis the rich and corresponding inequality. Unlike existing studies, which focus on selected indicators, our study considers all the relevant components of maternal health care services across three stages of continuum of care. It depicts the national level scenario instead of focusing upon specific states or regions, which is another important value addition of our paper. Our study findings conveyed that coverage of MNCH indicators increased during 2006-2016, especially among the poor and inequality declined, albeit in varying magnitudes, across the indicators.

As portrayed by the NFHS 4<sup>th</sup> report (IIPs and ICF 2017), our findings reiterate that coverage of all the eight indicators of MNCH services increased among ever married women aged 15-49 years during 2006-2016. Utilization of maternal health care services increased mainly among the non-poor until 2006 (Mohanty et al 2009) where as we found that increase in utilization of MNCH services is higher among the poorest women compared to the richest ones after 2006. One reason could be the utilization was already high among non-poor by 2006. For example, the use of institutional delivery increased by 48% among the poorest women while it increased only by 10% among the richest women during the decade. Our findings also show that despite the larger increase in service utilization among the poorest, the level of coverage among them in 2015-16 remained far below the coverage of these indicators among the wealthiest in 2005-06. For instance, 61% of the poorest women went for institutional delivery in 2015-16 while the proportion was 86% among the richest women in 2005-06.

Out of the eight indicators of MNCH services, we found that the increase in institutional delivery (13%-61%) is the highest among the poorest women during 2006-16, followed by using skilled birth assistants (21%-64%) during child delivery and post-natal checkup within 2 days of child delivery (14%-48%). In contrast, previous studies conducted in the pre-NRHM period across specific states reported an increase as low as 2% in the use of skilled birth assistants among the poorest during 1992-2006 (Pathak et al 2010).

Our findings show that the use of antenatal care services progressed slowly among the poorest during 2006-16. For instance, the consumption of iron and folic acid supplements, at least four ANC checkups and antenatal care visit during first trimester increased only by 8%, 13% and 15% respectively. These percentages are only moderately higher than those reported in Pathak et al (2010), which estimated that more than four antenatal checkups increased only by 0.2% among the poorest women during 1992-2006.

Inequality in MNCH services utilization decreased over the past decade although it persists. The magnitude of decline in inequality varies widely across indicators. Institutional delivery experienced the highest decline in inequality while the required consumption of iron and folic acid supplements during pregnancy increased the least. High equity has been achieved in the child delivery and post-partum care indicators while access is still unequal in the case of antenatal care services.

A meta synthesis of qualitative studies from African, South and Southeast Asian countries identified different factors influencing the low use of ANC services among poor women (Finlayson and Downe 2013). For example, lack of understanding of antenatal care benefits, considering pregnancy a normal life event – seeking antenatal care only when sick, preference for traditional healers and medicines especially in rural areas, high cost-burden including cost of transport, opportunity cost of wages foregone, etc., inadequate infrastructure, and lack of medicines in health care facility centers. Low quality of care is another important concern for low use of ANC care; patients face lack of respect, empathy and compassion from health care providers (Ardey and Ardey, 2015; Narichiti 2013). Historical evidence in the Indian context even noted that ASHAs, the link between NRHM and the communities, lacked training and knowledge and were poorly paid (Bajpai and Dholakia, 2011; Saprii et al, 2015), hampering their efficiency in delivering the required services. Education of women has also been found to be an important determinant of ANC, skilled birth assistance and postnatal care (Kesterton, et al 2010; Jat et al 2011).

Our study has the following limitations. First, we have not considered geographical, urban/rural and social-group variations in the coverage and inequality of MCH services. It is observed that variability in utilization of services is higher among the poorest compared to the richest women. Rich women usually live in urban areas and belong to higher social groups, which may partially explain the higher access to desired maternal health care services. Second, we classified rich/poor following the asset score defined in the NFHS survey. Although assessment of inequality based on wealth score definition may be affected by asset classification

or inclusion/exclusion of new assets across the two rounds of the survey, it is easy to compute and is accepted widely as a basis of comparison between the rich and the poor.

Despite these limitations, the study contributes to the scant literature on equity analysis in utilization of MNCH services at the national level after the implementation of the NRHM/NHM in India. Our findings highlight the need for accelerated efforts that are strategically targeted at the poor. Complementary programs such as improvement in women's education, creating economic opportunities for women along with direct intervention on maternal care needs to be focused upon since the interplay of all these factors lead to inequality. In addition, interventions related to improvement of the quality of care, increasing awareness, incentivizing comprehensive antenatal care seeking, increasing the number of frontline workers and lower-level facilities in areas most in need, to extend the continuum of care, and the provision of ongoing mentoring to health care providers can be tested at scale.

*Acknowledgements:* This work was supported by MacArthur Foundation (G-109245-0) under the aegis of “Policy research and advocacy for strategic investment in maternal, newborn and child health in India”. I am thankful to Dr. K. G. Santhya for her insightful comments.

## **Bibliography**

Ardey, Rashmi, and Rajeev Ardey. 2015. “Patient Perceptions and Expectations from Primary Healthcare Providers in India.” *Journal of Family Medicine and Primary Care*, **vol. 4**, no. 1, pp. 53–63

Barros, A.J.D., Rosman, c., Axelson, H, Loaiza, E., Bertoldi, A.D., Franca, G. V. A., Bryce., j., Boerma., J.T., Victora, C. G. 2012. Equity in maternal, newborn, and child health interventions in Countdown to 2015: a retrospective review of survey data from 54 countries; *Lancet*: **379**, 1225-33

Bajpai, N and Dholakia H R. 2011.Improving the performance of Accredited Social Health Activists in India, *Working paper 1*; Columbia Global Centers; South Asia; Columbia University

Boerma, J. T, J Bryce, Y. Kinfa et al. Mind the gap: equity and trends in coverage of maternal, newborn and child health services in 54 countdown countries. 2008. *Lancet*; **371**: 1259-67

Chaturvedi S, Ranadive B. Are we really making motherhood safe? A study of provision of iron supplements and emergency obstetric care in rural Maharashtra. 2007 *National Medical Journal*; **20**: 294-6

Countdown. 2015. A decade of tracking progress for maternal, newborn, and child survival; The 2015 Report; UNICEF and WHO, Washington, DC, USA

Finlayson K, Downe S. 2013. Why Do Women Not Use Antenatal Services in Low- and Middle-Income Countries? A Meta-Synthesis of Qualitative Studies. *Plos Medicine* **10(1)**: e1001373. doi:10.1371/journal.pmed.1001373

Gwatkin, D., Rutstein S., Johnston, A, Suliman., E and Wagstaff A. 2003. Initial country level information about socio-economic differences in health, nutrition and population; (2<sup>nd</sup> edition) Washington DC, World Bank

Houweling, AJ T; Ronsmans C, Campbell M R O, and Kunst E A. 2007. Huge poor rich inequalities in maternity and child care in developing countries; *Bulletin of World Health Organization*; **85 (10)** 745-754

International Institute for Population Sciences (IIPS) and Macro International. 2007. National Family Health Survey (NFHS-3), 2005-06, India. Mumbai: IIPS

International Institute for Population Sciences (IIPS) and ICF. 2017. National Family Health Survey (NFHS-4), India, 2015-16. Mumbai: IIPS

Jat TJ, Ng N, Sebastian MS. 2011. Factors affecting the use of maternal health services in Madhya Pradesh state of India: a multilevel analysis. *International Journal for Equity in Health*; **10: 59**.<https://doi.org/10.1186/1475-9276-10-59>



Joe, W., Perkins, J. M, Kumar, S, Rajpal, S and Subramanian, S. V. 2018. Institutional delivery in India, 2004-14: unravelling the equity-enhancing contributions of the public sector, *Health Policy and Planning*; **33(5)** 635-53

Kesterton AJ, Cleland J, Sloggett A, Ronsmans C. 2010. Institutional delivery in rural India: the relative importance of accessibility and economic status. *BMC Pregnancy and Childbirth*. 10: 30.<https://doi.org/10.1186/1471-2393-10-30>

Kumar, C, P.K. Singh, R.K. Rai.2013. Coverage gap in maternal and child health services in India: assessing trends and regional deprivation during 1992-2006; *Journal of Public Health*; **35 (4)** 598-606

Mohanty SK, Pathak PK. 2009. Rich-poor gap in utilization of reproductive and child health services in India, 1992-2005. 2009. *Journal of Bio-social Science*; **41(3)** 381-98

Mohanty, S. K and Kastor, A . 2017. Out of pocket expenditure and catastrophic health spending on maternal care in public and private health centers in India: a comparative study of pre and post national health mission period, *Health Economics Review*; 7-31

Ministry of Health and Family Welfare (MoHFW). 2005. National Rural Health Mission (2005-2012), Mission Document. New Delhi: Ministry of Health and Family Welfare, Government of India

Ministry of Health and Family Welfare (MoHFW). 2013. A Strategic Approach to Reproductive, Maternal, Newborn, Child and Adolescent Health (RMNCH+A) in India. New Delhi: Ministry of Health and Family Welfare, Government of India

Narichiti, Victoria. 2013. Patient Centered Hospitals: A Study to Evaluate the Effectiveness of Health Care Delivery in Three Selected Hospitals in Guntur District, Andhra Pradesh, India. Doctoral dissertation. Acharya Nagarjuna University, Guntur, India:

Pamuk ER. 1985. Social class inequality in mortality from 1921 to 1972 in England and Wales. *Population Studies*; **39** (1) 17-31

- Paul VK, Sachdev HS, Mavalankar D, Ramachandran P, Sankar M J, Bhandari N, Sreenivas V, Sundararaman T, Govil D, Osrin D, Kirkwood B. 2011. Reproductive health, and child health and nutrition in India: Meeting the challenge, *Lancet*, **377 (9762)**332-49
- Pathak P.K., Singh A., Subramanian, S.V. 2010. Economic inequalities in maternal health care: pre-natal care and Skilled Birth Attendance in India, 1992-2006. *Plos One* **5(10)** e13593. <https://doi.org/10.1371/journal.pone.0013593>
- Paredes KPP. 2016. Inequality in the use of maternal and child health services in the Philippines: do pro-poor health policies result in more equitable use of services? *International Journal for Equity in Health* 15: 181. <https://doi.org/10.1186/s12939-016-0473-y>
- Ray, S; Bhandari, P and Prasad, J B. 2018. Utilization pattern and associated factors of maternal health care services in Haryana, India: A study based on district level household survey data; *International Journal of Reproduction, Contraception, Obstetrics and Gynecology* **7(3)**: 1154-1163
- Randive B, Diwan V, De Costa A. 2013. India's conditional cash transfer program (the JSY) to promote institutional birth: is there an association between institutional birth proportion and maternal mortality? *PloS One* **8(6)** e67452. <https://doi.org/10.1371/journal.pone.0067452>
- Regidor, E. 2004. Measures of health inequality: Part 2; *Journal of Epidemiology and Community Health*; **58 (11)**, 900-903
- Saprii, L, Richards, E, Kokho P and Theobald S. **2015**. Community health workers in rural India: analyzing the opportunities and challenges Accredited Social Health Activists (ASHAs) face in realizing their multiple roles; *Human Resources for Health*; **13: 95**. DOI 10.1186/s12960-015-0094-3

Say, L, Chou, D, Gemmill A, Tuncalp O, Moller, A.B, Daniels, J, Gulmezoglu, A. M, Temmerman, M, Alkerma, L. 2014. Global causes of maternal death: a WHO systematic analysis; *Lancet Global Health*; **2 (6)**, e323-333

StataCorp. 2013. *Stata Statistical Software: Release 13*. College Station, TX: StataCorp LP.

Vellakkal S, Gupta A, Khan Z et al. 2017. Has India's national rural health mission reduced inequities in maternal health services? A pre-post repeated cross-sectional study. *Health Policy and Planning* **32**: 79–90.doi: 10.1093/heapol/czw100

Wagstaff A, Paci P, van Doorslaer E. 1991. On the measurement of inequalities in health. *Social Science and Medicine*; **33(5)**, 545–57

World Health Organization .1999. World Health Report 1999. World Health Organization, 1211 Geneva 27, Switzerland

World Health Organization. 2015. State of Inequality: Reproductive, maternal, newborn and child health; World Health Organization, Luxemburg

Wong KL, Restrepo-Méndez MC, Barros AJ et al. 2017. Socioeconomic inequalities in skilled birth attendance and child stunting in selected low and middle-income countries: wealth quintiles or deciles? *PloS One* **12(5)** e0174823. <https://doi.org/10.1371/journal.pone.0013593>

