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Multiple Vulnerabilities in Utilising Maternal and Child Health Services Across Regions of Uttar Pradesh, India

Prem Shankar Mishra
T S Syamala

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MULTIPLE VULNERABILITIES IN UTILISING MATERNAL AND CHILD HEALTH SERVICES ACROSS REGIONS OF UTTAR PRADESH, INDIA

Prem Shankar Mishra* and T S Syamala**

Abstract

Although there are multiple vulnerabilities in access to MCH services in India, the research has always been focussing on single dimension vulnerabilities like economic vulnerabilities or social vulnerabilities. Individuals who are poor may also face other types of vulnerabilities which together affect the access to health services. This paper, therefore, investigates the linkages between multiple vulnerabilities and utilisation of maternal and child care services. Data from NFHS (2015-16) for the state of Uttar Pradesh were used for analysing the key outcome variables namely women who received full-antenatal care (ANC), delivery care, post-natal care (PNC) and full-immunisation for children age groups 12-23 months. Bivariate analysis and binomial logistic regression analysis were employed to examine the multiple vulnerabilities on utilising MCH care services across three dimensions of vulnerabilities such as education, wealth and caste. The paper identifies strong linkages between multiple vulnerabilities and the utilisation of MCH services. Women with multiple vulnerabilities were less likely to utilise essential maternal and child healthcare services. Utilisation of MCH care services declines with increasing vulnerabilities. A multi-sectoral approach is therefore required to deal with the issues of low access and under-utilisation of maternal and child care services in the state.

Key Words: Caste and Class, Multiple Vulnerabilities, MCH care, Uttar Pradesh

Introduction

Although India has made considerable progress in achieving the Millennium Development Goals (MDGs), progress in several maternal and child health (MCH) indicators are still not at the expected levels. A large number of maternal and child deaths are still caused by low-access and under-utilisation of essential health services. Several studies in India have reported that inequities exist in access to maternal healthcare between states and within states and across regions (Navneetham K. & Dharmalingam A., 2002; Subramanian *et al*, 2006; Deaton & Dreze, 2009). Further, variations in access to MCH services can also be seen across different segments of the population. Low education, social class and poverty have been shown to be significantly associated with lower utilisation of MCH services. The studies have also shown that variation across income groups in access to maternal care is widening, with poor women receiving fewer services than those who are better off (Pandey, *et al*, 2004; Pathak, P. K. *et al*, 2010).

North Indian states like Uttar Pradesh, Bihar, and Jharkhand have lower levels of utilisation of MCH services as compared to most of the south Indian states (Dehury R. K. & Samal, J., 2016). The MCH care services in Uttar Pradesh are particularly poor and they have been seen to be highly

* PhD-Research Scholar (Senior Research Fellow), Department of Population Research Centre, Institute for Social and Economic Change (ISEC), Bengaluru-560072, Karnataka, India. Email: premshankar@isec.ac.in.

** Associate Professor & Head, Department of Population Research Centre, Institute for Social and Economic Change (ISEC), Bengaluru-560072, Karnataka, India. Email: syamala@isec.ac.in.

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inequitable across socio-economic groups. Although maternal and child healthcare has improved in Uttar Pradesh over the last few decades, as is evident from different empirical studies, the progress has been slow and uneven within the state (Saroha, E. *et al*, 2008; Tripathi, T., 2016). For example, the number of women who received antenatal care for their last pregnancy and institutional delivery in Uttar Pradesh increased between 1992 and 2015, from 44.7 per cent to 72 per cent and from 11.2 per cent to 67.8 percent, respectively; however, the existing rich-poor gap (i.e., the ratio of the richest to the poorest wealth quintile) in the use of antenatal care remained high over the period, while the proportion for institutional delivery declined (IIPS & Macro International, 1995; IIPS & ICF, 2017). Similarly, the illiterate-literate ratio and Scheduled Caste/Scheduled Tribes to others ratio for the use of antenatal care has widened over the same period (IIPS & ICF, 2017).

Although the proportion of women receiving medical assistance at delivery in Uttar Pradesh has increased from 17.2 per cent in 1992 to 69.6 per cent in 2015, there is a huge gap in receiving medical assistance among poor women and non-poor women. Similarly, the educational differential in institutional delivery in 1992 was 11.8 per cent for women with no education (illiterate) and 75 per cent for those with 10 or more years of schooling. The same figure in 2015 was 56 per cent for women with no education and 85.8 per cent for women with 10 or more years of schooling, indicating a faster improvement among women with no education (IIPS&Macro International, 1995; IIPS & ICF, 2017). Further, a study conducted in 2005-06 also showed that the proportion of babies between 2005 and 2006 that were delivered in a health institution varied from 31 per cent for women with no education to 68.8 per cent for women with 12 and more years of schooling (Mohanty, S. K., 2012). Likewise, the proportion of full ANC coverage and institutional delivery variations across social groups show slow progress among socially disadvantaged groups like SC/STs (Scheduled Caste/ Scheduled Tribe) than in the other groups.

Several studies have contributed to understanding the income disparities in maternal healthcare utilisation (Houweling TAJ *et al*, 2007; Mohanty S. K. & Pathak P. K., 2009; Mohanty, S. K., 2012). Several studies analysed various rounds of DHS (demographic and health survey) data to understand the inequalities in maternal and child health across household wealth quintiles after controlling for other social and demographic variables (Hong R. *et al*, 2006; Ladusingh L & Singh, C. H., 2007; Mohanty S. K. & Pathak P. K., 2009; Mohanty, S. K., 2011; Mohanty, S. K., 2012). Furthermore, there are other outlines of determinants which influenced maternal and child health related care and have been contextualised in different Indian states (Ladusingh, L. & Singh C. H., 2007). Apart from economic status, there are several other factors which determine the vulnerability, i.e. social determinants (Mechanic, D., 2002; Phelan, J. C. *et al*, 2010; Balarajan Y. *et al*, 2011; Borooah *et al*, 2012). Two important factors such as poor education and lower caste are typical in Indian conditions which add vulnerability too in seeking maternal and child care services (Saroha, E. *et al*, 2008; Gupta A. *et al*, 2016). Many studies have independently demonstrated the effect of each of these factors on maternal and child health (Goli S., Doshi R. & Perianayagam A., 2013; Mohanty S. K., 2012; Borooah, *et al*, 2012).

However, very few studies have looked at the effect of multiple vulnerabilities and their linkages on the utilisation of health services. For example, a poor woman may also be poor

educationally, or she may also belong to a disadvantaged caste group. With this context, the concept of multiple vulnerabilities has received recent attention from both researchers and policymakers because the use of individual-level socioeconomic indicators alone may fail to capture the health inequalities. Approaches covering multiple vulnerabilities can take into account the effects of the individual as well as the household and contextual disadvantages that impact on health.

Equity in health is the absence of systematic disparities in health (or in the major social determinants of health) between groups. Knowledge of aggregate effects of multiple vulnerabilities is needed to shed light on the determinants of growing health inequities. The objective of this paper is to understand the linkages between multiple vulnerabilities and maternal and child healthcare utilisation in the state of Uttar Pradesh and its region.

Multiple Vulnerabilities: Issues and Concerns

The association between vulnerabilities and health outcomes have always focussed on a single vulnerability like income or education and its linkages with health outcomes. However, in any society, poor people may also have less education or poor health, or they may be from socially disadvantaged groups. Those individuals who face more than one vulnerability may have a greater burden than those who face a single vulnerability. For example, women who belong to poorer households are more likely to have adverse health outcomes than those who are from wealthier households. If those poor women also lack education or if they are from socially disadvantaged groups, their burden increases and they may have lower utilisation of health services than those who face only a single vulnerability (Mohanty, S. K., 2012; Mohanty, S. K., 2011). Therefore, to address the inequality in healthcare access and service utilisation, there is a greater need to understand this using the lens of multiple deprivations of wealth, education, class, caste, and regional status. Studies have demonstrated that women who belong to the disadvantaged groups remained disadvantaged in healthcare access and utilisation of health services (Anand & Yusuf, 2011; Saroha, E. *et al*, 2008; Mohanty, 2012; Prusty, R. K. *et al*, 2015).

The disadvantaged groups of people can be identified in relative terms, such as socially disadvantaged, economically disadvantaged, disadvantaged concerning gender and geographically disadvantaged. The disadvantaged groups of people can also be recognised in three ways; firstly, at the individual level, secondly, at the family or household characteristics level and thirdly the socio-economic groups' characteristics level (Brook, R. H. & Williams, K.N., 1975).

India is a caste-driven society, and caste plays a significant role in defining the socio-political and economic structure of its society. In the hierarchy of social status, Scheduled Castes (SCs), namely Dalits, and Adivasis or Scheduled Tribes (STs) are the most disadvantaged groups. There is literature to support the view that social deprivation may affect people more than wealth and health (Saroha, E. *et al*, 2008; Mosse, D., 2018). In economic class, there is a hierarchy in which the poor are more deprived in accessing public resources than the rich class. In India, socio-economic status determines the health status of a particular individual or community (Bhatia *et al*, 2006; Montagu, D. *et al*, 2011).

A multi-dimensional vulnerability identifies clusters of vulnerability. While measuring multiple vulnerabilities, there are theoretical and methodological challenges which include contextualising the dimensions and indicators in order to fix the cut-off point for "poor" and "non-poor", and aggregation of

multiple dimensions into a single index, weighting of dimensions and choosing the unit of analysis (Sen, A. K., 1992; Alkire, S., 2007; Alkire, S. and Foster, J., 2009; Mohanty, S.K., 2012).

This paper, therefore, understands the three-dimensional vulnerability of wealth, education, and caste and their linkages with the utilisation of maternal and child health services in Uttar Pradesh. Since Uttar Pradesh is a large state, the linkages are also looked at for its four regions, namely Western, Avadh (middle), Bundelkhand (south) and Purvanchal (eastern).

Poor socio-economic indicators and uneven development in Uttar Pradesh as a whole and across regions in particular have made a severe impact on the overall health outcomes of the state. Demographic factors have also made a significant impact on the lower health status in the state. Hardly any study has tried to analyse the regional level deprivations in the utilisation of maternal and child healthcare services in Uttar Pradesh. Though an investigation has attempted to understand the overall health outcomes of the state and its regions (Tripathi, T., 2016), it found that there are substantial factors related to socio-cultural and economics that have played a critical role in accessing healthcare services across regions. The poor, Scheduled Caste and the marginalised sections of society suffer immense deprivations in utilising MCH care services. Further, socioeconomic issues can also make a difference in utilising maternal and child healthcare services across various regions in Uttar Pradesh. Therefore an estimate of regional level deprivations/vulnerability in MCH care needs to be done in this study.

Materials and Methods

The data were used from the National Family Health Survey, fourth round 2015-16. In Uttar Pradesh, NFHS-4 has provided information on reproductive and child healthcare practices for all 71 districts of the state. The survey covered 76,233 households and collected information from 97,661 women in the age group 15-49 and 13,835 men in the age group 15-54. In the case of ever-married women, the sample is 41,375 in the state. In this round of the survey, for the first time, district level (district module) information has been estimated on reproductive and child healthcare services. The survey provides information on women's characteristics, marriages, fertility, contraception, reproductive health, children's immunisations and treatment of childhood illnesses. In the previous round of the survey, all this information was available at the state and national levels. The study uses NFHS-4 data to understand the current status of service utilisation among the disadvantaged groups of people with multiple dimensions of deprivation in the state of Uttar Pradesh and its regions. Only ever-married women who have given birth in the last five years have been considered for the analysis.

The level and the utilisation pattern of MCH services across the region in Uttar Pradesh has been analysed by using the multiple vulnerability approach. The outcome variables used here are full antenatal care (ANC), institutional delivery and postnatal care (PNC) as indicators of the utilisation of maternal healthcare services and coverage of full immunisation as a child healthcare variable. Descriptive statistics, bivariate and logistic regression analysis are carried out to estimate the level and pattern of multiple vulnerabilities and its linkages in the utilisation of maternal and child healthcare services. Results are shown as predicted probabilities which derived from logistic regression and

predicted probabilities adjust at the mean of all other independent variables. The analysis has been carried out for Uttar Pradesh and its regions.

Vulnerability Measures

To understand multiple deprivations/vulnerabilities, a variable integrating the three dimensions of deprivation based on education, wealth and caste was constructed as they were used in the two Human Poverty Indexes and the Multidimensional Poverty Index (instead of caste they used health). The low education category is classified as those women who did not complete five years of schooling. For education, a woman is considered to be deprived or vulnerable if she reported in her individual survey that she had not completed five years of schooling. This cut-off is chosen because people with only a few years of education have been found to have health-seeking behaviour similar to those with no education. As NFHS does not collect information on consumption or income of the household, household economic proxies such as housing quality, household amenities, and consumer durables were used to construct the composite wealth quintile. Those who are the poorest or poorer from the wealth quintile per se have been considered as economically "poor" and middle, richer and richest a "non-poor."

For caste, a woman is considered vulnerable if she belongs to Scheduled Caste or Scheduled Tribe. Using the three dimensions of vulnerability based on education, wealth and caste, eight categories of vulnerability are possible: education, wealth and caste; education and wealth; education and caste; wealth and caste; education only; wealth only; caste only and none. The first four categories classified vulnerability in multiple dimensions, the next three in one dimension and the last category in none. The state-level data is sufficient to show differentials in MCH care for all eight categories of vulnerability/deprivation. However, the regional level data issued for only four groups- vulnerable in none, in one dimension, in two dimensions and vulnerable in three dimensions.

Dependent Variables

Full Antenatal care (ANC): In the NFHS-4 survey, the questions asked to women were whether they "had at least four visits for ANC check-up, received at least one TT (tetanus toxoid), and consumed at least 100 IFA (Iron Folic Acid) tablets/syrup" for recent birth during the five years preceding the survey.

Institutional Delivery: Institutional delivery is defined as the deliveries that happened in the hospitals/health facilities, either public or private. In the survey, the question was asked to women for their current live births in the last five years preceding the survey where their children were born.

Postnatal care (PNC)**:** In the survey, women who had their last birth in five years preceding the survey were asked "Did you have any check-up within 42 hours after delivery?" and "How many days after delivery did the first check-up take place?" In this study, women who went for a check-up to any health facilities/doctors within two weeks of delivery are considered to have used postnatal care services.

***Full Immunisation*:** A child in the age group of 12-23 months is fully immunised if she or he has received BCG, measles, and three doses each of DPT and polio vaccines.

Analysis and Discussion

Dimensions of Vulnerabilities in Uttar Pradesh: Table 1 presents the proportion of women by different types of vulnerabilities in Uttar Pradesh. In Uttar Pradesh, 57 per cent of the women are poor, 47 per cent have low education, and 27 per cent belong to Scheduled Caste, Scheduled Tribe category.

Table 1: Proportion of ever-married women (age groups 15-49) with different types of vulnerabilities in Uttar Pradesh and Its Regions, NFHS-2015-16

Categories of vulnerability	Uttar Pradesh	Region			
	Total	Western	Avadh	Bundelkhand	Purvanchal
Poor	56.96	39.75	67.3	65.07	66.02
Low Education	47.12	48.1	43.98	36.5	48.45
SCs/STs	26.98	21.3	33.5	31.34	28.63

The regional variations in different types of vulnerabilities indicate that income vulnerability is the least in the western region with 40 per cent of the women belonging to poor category whereas the poverty levels are above 65 per cent in the other three regions. Educational vulnerability is lower in Bundelkhand and Avadh regions, and socially disadvantaged groups are higher in Avadh and Bundelkhand regions. Overall, considering all the three types of vulnerabilities, the level of vulnerability is higher in Purvanchal and Avadh regions as compared to the other two regions.

Table 2: Percentage of ever-married women by dimensions of vulnerability in Uttar Pradesh and its regions, 2015-16

Categories of vulnerability	Uttar Pradesh	Region			
	Total	Western	Avadh	Bundelkhand	Purvanchal
	n= 41375	n= 16002	n= 5719	n= 2720	n= 16934
Any of them	73.36	67.83	76.99	76.01	76.15
Education and wealth	23.25	20.51	23.29	19.2	25.77
Wealth and caste	31.16	24.82	35.94	31.37	34.37
Education and caste	32.76	27.54	37.04	32.61	35.28
All the three	12.36	6.88	15.34	12.14	15.61
None	26.57	32.17	22.93	23.96	23.72

Source: NFHS-4

Table 2 presents the different dimensions of vulnerabilities in Uttar Pradesh. Overall, 73.3 per cent of ever-married women reported being deprived in any of them (either education or wealth or caste). 23.3 per cent in education and wealth, 31.2 per cent in wealth and caste, 32.7 per cent in education and caste, and 12.4 per cent in all three dimensions; 26.6 per cent are not deprived in any dimension at the state level.

The correlation coefficients of dimensional deprivations were weak and found to be 0.35 for education and wealth, 0.05 for education and caste and 0.21 for wealth and caste, which indicates that these dimensions are unlikely to overlap.

The regional variations in dimensions of vulnerabilities indicate that any type of vulnerability is the least in the western region as compared to the other three regions. Similarly, the proportions of women who do not belong to any of the three vulnerable sections were the highest in the western region. The vulnerabilities concerning education and wealth, wealth and caste and education and caste were also least in the western region. Overall, the data show that there are variations in vulnerability levels across regions of Uttar Pradesh. The vulnerability levels are least in the western region as compared to the other three regions.

Table 3: Percentage distributions of ever-married women by the dimension of vulnerabilities in Uttar Pradesh and its regions-NFHS-4, 2015-16

Uttar Pradesh and its regions	Dimensions of Vulnerability			
	None	One	Two	Three
Uttar Pradesh Total	26.64	28.12	32.84	12.4
Western	32.17	33.4	27.54	6.88
Avadh	22.96	24.59	37.09	15.36
Bundelkhand	23.97	31.27	32.62	12.14
Purvanchal	23.85	24.98	35.47	15.7

Table 3 provides the distribution of women with dimensions of vulnerabilities in Uttar Pradesh and its regions. Overall, 27 per cent of the women in Uttar Pradesh do not face any type of vulnerabilities, and 12 per cent face all the three vulnerabilities. The proportion of women with anyone or any two vulnerabilities are 28 per cent and 33 per cent respectively. Regional variations in levels of vulnerability show that multiple vulnerabilities are higher in Purvanchal and Avadh regions than Western and Bundelkhand regions.

Table 4: Utilisation of maternal and child care services among ever-married women who had at least one live birth in the five years preceding the survey by dimensions of vulnerability

Type of MCH Care	Dimensions of deprivation							
	None	One			Two			Three
		Education	Caste	Wealth	Education Wealth	Educatio n caste	Wealth caste	Education Wealth, caste
Full ANC	(n=8133)	(n=12788)	(n=7501)	(n=15605)	n= 9682	n= 3835	n=5573	(n=3381)
	14.42	1.73	2.99	1.77	1.1	1.3	1.33	0.81
No ANC	9.14	34.15	28.62	33.32	38.67	34.36	35.14	39.96
Institutional delivery	(n=10992)	(n=19490)	(n=11131)	(n=23561)	(n=14787)	(n=5773)	(n=8389)	(n=5114)
	82.83	56.55	64.36	61.42	54.85	56.17	61.65	55.52
Delivery at home	16.82	43.13	35.28	38.2	45.04	40.69	40.8	44.13
PNC	(n=8183)	(n=12833)	(n=7522)	(n=15667)	(n=9718)	(n=3846)	(n=5589)	(n=3391)
	75.14	54.24	57.21	53.92	50.28	51.71	53.36	49.74
Full Immunisation	(n=2119)	(n=3341)	(n=2054)	(n=4235)	(n=1651)	(n=2463)	(n=2350)	(n=823)
	60.81	43.24	51.48	45.3	39.28	44.59	43.67	41

Source: NFHS-4 2015-16

Table 4 represents the utilisation of maternal and child healthcare services among all ever-married women who gave at least one live birth in the five years preceding the survey across dimensions of vulnerability. The table clearly shows that women who had multiple vulnerabilities were less likely to receive various MCH services. Overall, the data show that the full ANC coverage in the state is very low and as low as 14 per cent for those women with no deprivation. As compared to 1.7-3 per cent of those deprived of any one dimension, 1.1-1.3 per cent of those deprived in two dimensions and 0.8 per cent of those deprived in all three dimensions. Similarly, the proportion of women with no antenatal care was only 9 per cent when there is no deprivation while this proportion has increased to 40 per cent when they are deprived of all three dimensions.

The level of receiving institutional delivery is similar to that for full ANC service utilisation. Of live births that occurred to ever-married women in the previous five years, the proportion of delivery that happened in the health facilities is 83 per cent among those women who do not face vulnerability in any of the three dimensions compared with 55 per cent among those women who are vulnerable concerning all three dimensions. Further, with an increase in dimensions of vulnerability, the institutional delivery proportion decreases. Among women deprived in one dimension, the proportion of births that took place in health facilities is the lowest for those deprived in education (56.5%), followed by those deprived in wealth (61.4%) and those deprived in caste (64.4%); among women deprived in two dimensions, the proportion of births that took place in health facilities is the lowest among those deprived in education and wealth (54.8%), followed by those deprived in education and caste (56.2%), and those deprived in wealth and caste (61.7%). The data on deliveries that occurred in public and private health facilities show that the proportion of women who delivered in private health facilities declined drastically from 44 to 9 per cent when women moved from none to all three dimensions of deprivation.

The pattern of utilisation for postnatal care (PNC) is similar to that of the other two indicators. The proportion of women who had received PNC is higher among those with no deprivations or vulnerabilities than among those with deprivation in all three dimensions (75.2% vs. 49.7%). Among those deprived in one dimension, the proportion receiving PNC is lower for those deprived in wealth (53.9%) than for those deprived in education (54.2%) or caste (57.2%); among those deprived in two dimensions, the proportion receiving PNC varied from 50 per cent for those deprived in education and wealth, 52 per cent for those deprived in education and caste, and 53 per cent for those deprived in wealth and caste.

Full immunisation coverage among children aged 12-23 months is the highest among those with no deprivations (61%) than those with deprivation in all three dimensions (41%). Among those deprived in one dimension, the proportion receiving full immunisation is lower for those deprived in education (43%) than for those deprived in wealth (45%) or caste (51%); among those deprived in two dimensions, the proportion receiving full immunisation varied from 39 per cent for those deprived in education and wealth, 45 per cent for those deprived in education and caste, and 44 per cent for those deprived in wealth and caste.

Table 5: Percentage of full antenatal care received by the ever-married women in the recent births, preceding the five years, by dimensions of vulnerability and ratio of percentage, by the percentage of vulnerability in Uttar Pradesh and its regions

Uttar Pradesh and regions	Dimensions of Vulnerability					Ratio of None to		
	All	None	One	Two	Three	One	Two	Three
UP Total	6	14.42	4.4	1.65	0.81	3.3	8.7	17.8
Western	7.65	15.78	4.67	2.1	1.13	3.4	7.5	14.0
Avadh	4.4	12.18	3.23	1.23	0.46	3.8	9.9	26.5
Bundelkhand	2.93	7.07	1.48	1.63	0.97	4.8	4.3	7.3
Purvanchal	5.63	14.51	4.9	1.56	0.83	3.0	9.3	17.5

Source: NFHS-4 2015-16

Understating of differences in women's utilisation of full ANC services is explored across the regions in Uttar Pradesh. The utilisation level and service coverage of ANC services vary among women across regions. Antenatal care ranged from 2.9 per cent in Bundelkhand to 7.6 per cent in Western region (Table 5), and institutional delivery at the health facilities ranged from 82 per cent in Bundelkhand to 66 per cent in Western region (Table 6**)**. Utilisation of maternal and child healthcare services also varied remarkably by the dimension of deprivation/vulnerability across regions, generally decreasing with an increased level of deprivation.

For example, in Avadh region, the proportion of women who had full ANC and the proportion of institutional delivery are greater among women with no deprivations (12.2% and 84.7%) than among those deprived in one dimension (3.2% and 74.2% respectively), two dimensions (1.2% and 60.5%) or all three dimensions (0.46% and 54.5%). Similarly in Western, Purvanchal and Bundelkhand regions, increasing deprivation level showed decreased utilisation of MCH services. To understand better the inequality in the utilisation of MCH care across different groups, ratios are calculated to compare the service utilisation of women not deprived in any dimension with that of women deprived in one, two or three dimensions; closer the ratio is to 1.0, lower the inequality is between the groups.

Table 6: Institutional delivery received by the ever-married women in the recent birth, preceding the five years, by dimensions of vulnerability and ratio of percentage, by the percentage of vulnerability in Uttar Pradesh and its regions

Uttar Pradesh and its regions	Dimensions of Vulnerability					Ratio of None to		
	All	None	One	Two	Three	One	Two	Three
UP-Total	67.93	82.83	69.86	58.93	55.52	1.2	1.4	1.5
Western	65.68	80.17	63.31	54.3	55.13	1.3	1.5	1.5
Avadh	68.54	84.67	74.22	60.54	54.56	1.1	1.4	1.6
Bundelkhand	81.79	90.6	85.66	75.18	72.15	1.1	1.2	1.3
Purvanchal	68.31	84.37	73.55	59.89	54.92	1.1	1.4	1.5

Source: NFHS-4 2015-16

For ANC the ratio of women deprived in no dimension to those deprived in one is highest in Bundelkhand (4.8), and Avadh (3.8); the lowest ratios were Purvanchal (3) and Western (3.4). For the higher levels of deprivation, the ratios were substantially higher in all regions ranging from 4.3 to 9.9

for two dimensions and 7.3 to 26.5 for three dimensions. For institutional delivery, the ratio of women deprived in no dimension to those deprived in one is the highest in Western (1.3), and the lowest in Avadh (1.1), Bundelkhand (1.1) and Purvanchal (1.1). For higher levels of deprivation, the ratios substantially increased in all regions ranging from 1.2 to 1.5 for two dimensions and 1.3 to 16 for three dimensions.

Table 7: Percentage of Post Natal Care received by the ever-married women in the recent births, preceding the five years, by dimensions of vulnerability and ratio of percentage, by the percentage of vulnerability in Uttar Pradesh and its regions

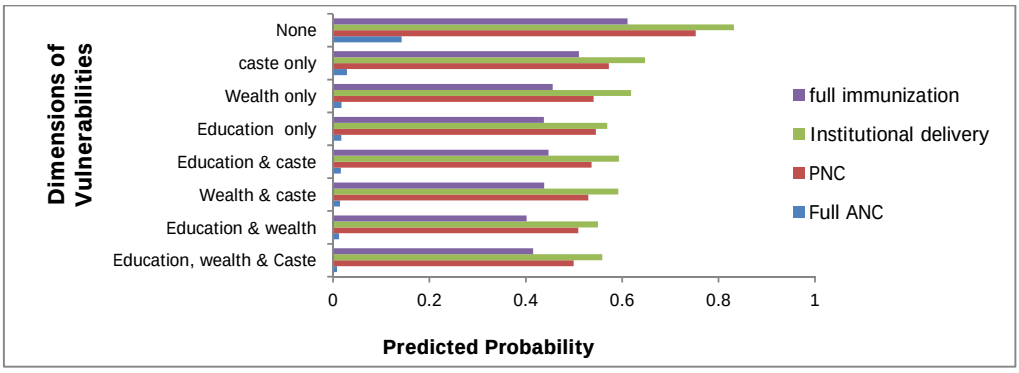
Uttar Pradesh and its regions	Dimensions of Vulnerability					Ratio of None to		
	All	None	One	Two	Three	One	Two	Three
Uttar Pradesh Total	62.21	75.14	64.14	53.49	49.74	1.2	1.4	1.5
Western	73.16	81.24	71.22	66	68.04	1.1	1.2	1.2
Avadh	56.79	69.87	59.58	50.17	45.53	1.2	1.4	1.5
Bundelkhand	59.39	62.85	60.59	57.73	52.64	1.0	1.1	1.2
Purvanchal	56.16	71.84	59.28	47.13	44.93	1.2	1.5	1.6

Source: NFHS-4 2015-16

The differences in postnatal care (PNC) across deprivation groups are similar to those in institutional delivery care (Table 7). Regions with low usage of ANC also had low usage of postnatal care (PNC). However, in postnatal care, the use of postnatal care differed across regions. The PNC ranged from 56 per cent in Purvanchal to 73 per cent in the Western region (Table 7), and full immunisation ranged from 35 per cent in Purvanchal to 47 per cent in the Western region (Table 8).

The proportion of women who received PNC and full immunisation for their children is the highest among women with no deprivations (for PNC ranging from 62 per cent in Bundelkhand to 81 per cent in Western and for full immunisation ranged from 43 per cent in Purvanchal to 53.3 per cent in Western) than among those deprived in one dimension and two and three dimensions.

Figure 1: Among ever-married women who had had at least one live birth in the previous five years, predicted probability of having received full ANC, PNC and institutional delivery and among children 12-23 months who received full immunisation before the survey, predicted probability by dimensions of deprivation



Notes: Adjusted for the age of mother, place of residence, Uttar Pradesh' regions, religion and birth order

Predicted probabilities for each of the four maternal and child health outcomes indicators have been estimated, adjusting for other social and demographic factors such as the age of mother, place of residence, regions, religion and birth order. The predicted probability of full antenatal care for each level of a vulnerability is lower than that of full immunisation, postnatal care (PNC), and institutional delivery. Women who have been deprived in all three dimensions are less likely than those who have not been deprived in any to have received antenatal care (predicted probability, 0.008 vs. 0.14), full immunisation (0.4 vs. 0.6), postnatal care (0.5 vs. 0.8) and institutional delivery (0.5 vs. 0.8). In addition, the probability of each outcome is the lowest among those deprived in all three dimensions followed by those deprived in education and wealth, education and caste, education only, caste and wealth, wealth only, caste only and in none. For example, the predicted probability of institutional delivery was 0.55 for birth delivered in hospitals to women deprived in all three dimensions, 0.55 for those to women deprived in education and wealth, 0.60 for those to women deprived in education and caste, 0.59 for those to women deprived in wealth and caste, and 0.83 for those to women not deprived in any dimension. Overall, a single level of deprivation like education only appears stronger than the others, i.e. caste only and wealth only. After adjusting for confounders, women deprived in education alone were less likely to use maternal and child healthcare services such as full ANC, PNC, institutional delivery, and full immunisation than those deprived of both wealth and caste.

Table 8: Percentage distribution of children age 12-23 months who received full vaccination before the survey by dimensions of vulnerability, a ratio of percentage and by percentage to vulnerability, region-wise in Uttar Pradesh, 2015-16

Uttar Pradesh and its regions	Dimensions of Vulnerability					Ratio of None to		
	All	None	One	Two	Three	One	Two	Three
Uttar Pradesh Total	51.62	60.81	54.6	44.59	41	1.1	1.4	1.5
Western	61.13	68.06	61.14	52.25	58.24	1.1	1.3	1.2
Avadh	51.1	57.61	53.64	49.08	43.11	1.1	1.2	1.3
Bundelkhand	58.52	61.9	55.24	56.6	*	1.1	1.1	*
Purvanchal	43.62	53.78	47.98	37.39	32.7	1.1	1.4	1.6

* sample size is not supporting the analysis

For the PNC and full immunisation, the ratios of women deprived in no dimension to those deprived in one are the highest, and it substantially increased in higher levels of dimension like two and three dimensions. It follows a similar pattern like institutional delivery in PNC, full immunisation, and also the ratios of no deprivation to one, two, and three dimensions of deprivation are similar. Across regions, the highest inequality is seen in the Western region among the different dimensions of deprivation and the lowest in Bundelkhand.

Through this analysis, Purvanchal region has been found one of the most disadvantaged regions followed by Avadh, Bundelkhand and Western in Uttar Pradesh. The intensity and volume of inequality are high in the Western region within and between the deprivation groups.

Table 9: Among ever-married women who had had at least one live birth in the previous five years, predicted the probability of having received full antenatal care, postnatal care, and institutional delivery and among children 12-23 months who received full immunisation before the survey, predicted probability by dimensions of deprivation/vulnerability, in Uttar Pradesh and its regions

(A)

State/regions	Full Antenatal Care				Postnatal Care			
	None	One	Two	Three	None	One	Two	Three
Uttar Pradesh Total	0.14	0.04	0.02	0.008	0.75	0.64	0.54	0.50
Western	0.16	0.05	0.02	0.009	0.82	0.72	0.65	0.64
Avadh	0.12	0.03	0.01	0.006	0.70	0.59	0.50	0.47
Bundelkhand	0.07	0.02	0.01	0.004	0.72	0.61	0.52	0.49
Purvanchal	0.14	0.05	0.02	0.009	0.70	0.58	0.49	0.46

(**B)**

State/regions	Full Immunisation				Institutional Delivery			
	None	One	Two	Three	None	One	Two	Three
Uttar Pradesh Total	0.61	0.55	0.45	0.42	0.83	0.70	0.59	0.56
Western	0.68	0.61	0.52	0.52	0.83	0.68	0.58	0.58
Avadh	0.64	0.59	0.50	0.47	0.83	0.72	0.60	0.56
Bundelkhand	0.59	0.54	0.46	0.40	0.84	0.74	0.63	0.55
Purvanchal	0.53	0.47	0.38	0.36	0.83	0.72	0.60	0.55

Notes: Adjusted for the age of mother, place of residence, Uttar Pradesh' regions, religion and birth order

A set of binary logistic regressions examining the association between level of vulnerability and utilisation of maternal and child healthcare services controlling for social and demographic covariates are conducted for Uttar Pradesh and its regions. Results are shown as adjusted probabilities at the mean of all other independent variables. In general, the multivariate analysis supports those from the bivariate analyses. It showed that the probability of using each of maternal and child healthcare services decreased with increasing level of vulnerability. For example, in the Bundelkhand region, the probability of receiving full antenatal care is 0.07 among those who have not been deprived in any dimension, 0.02 among those deprived in one dimension and 0.004 among those deprived in all three dimensions. Similarly, in Purvanchal region, the probability of delivering birth in the hospitals is 0.83 among those not deprived in any dimension, 0.7 among those deprived in one dimension, 0.6 among those deprived in two dimensions and 0.5 among those deprived in all three dimensions.

Conclusion and policy implications

Overall, the study brings out the interesting dimensions on understanding the linkages between multiple vulnerabilities and utilisation of MCH services in Uttar Pradesh and its regions. Although there have been improvements in the utilisation of different MCH services, there are inequalities in several of those utilisation indicators within and across regions. Further, women with multiple vulnerabilities were less likely to have access to essential maternal and child healthcare.

The use of maternal and child healthcare services-full ANC, institutional delivery, PNC, and full immunisation - vary significantly among women by the level of deprivation/vulnerability in Uttar Pradesh. Overall, the utilisation of MCH services declines with increasing levels of deprivation. The educational vulnerability appears to be stronger than other types of vulnerabilities such as caste and wealth in the utilisation of MCH services. The utilisation of maternal and child healthcare services also varies across the regions and among socioeconomic groups in the state. Women from Purvanchal region appear to have a low level of MCH service utilisation followed by Avadh and Bundelkhand, and in all the regions there exist inequality in service utilisation. Hence, a special focus is required to deal with issues such as low-access and under-utilisation of MCH services in Uttar Pradesh and its regions.

In general, the differences between those with multiple deprivations and those with none appear to be high in the regions where already service coverage is low and low in the regions where service coverage is high. Such differences may arise from differences in availability, accessibility, and quality of care in public health centres. Actions to address inequities in MCH services, as well as access to general healthcare, should be comprehensive and based on a multi-sectoral approach. Further, concerted efforts are required to improve women's education as education appears to be a stronger factor that determines the utilisation of health services. In addition, a programme which focuses on increasing household income also can bring in better healthcare utilisation.

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Dr V K R V Rao Road, Nagarabhavi P.O., Bangalore - 560 072, India
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