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

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Although there are multiple vulnerabilities that may prevent access to maternal and child health services in India, the literature has so far focused on unidimensional vulnerabilities—typically, economic or social vulnerabilities. The linkages between multiple vulnerabilities and the utilisation of MCH services are investigated using data from National Family Health Survey-4 (2015–16) for Uttar Pradesh to analyse whether women received full antenatal care, institutional delivery care, postnatal care, and full immunisation for their children. Bivariate analysis and binomial logistic regression analysis are employed to examine the multiple vulnerabilities that service utilisation across three dimensions—education, wealth, and caste. Women with multiple vulnerabilities are less likely to utilise essential MCH services.

Although India has made considerable progress in achieving its Millennium Development Goals, it has lagged on several maternal and child health (MCH) indicators. A large percentage of maternal and child deaths in India are caused by low access to and underutilisation of essential health services. Several studies in India have reported on inequities in access to maternal healthcare between states, within states, and across regions (Navaneetham and Dharmalingam 2002; Subramanian et al 2006; Deaton and Drèze 2009). Further, access to MCH services varies across different segments of the population. Low education, lower social class, and poverty are significantly associated with lower utilisation of MCH services. Studies have also shown that the gap in various income groups’ access to maternal care is widening, with poor women receiving fewer services than those who are better off (Pandey et al 2004; Pathak et al 2010).

North Indian states like Uttar Pradesh, Bihar, and Jharkhand exhibit lower utilisation of MCH services compared to most of the south Indian states (Dehury and Samal 2016). The MCH services in Uttar Pradesh are particularly poor and different socio-economic groups have inequitable access to them. Although MCH care has improved in Uttar Pradesh over the last few decades, progress has been slow and uneven (Saroha et al 2008; Tripathi 2016). For example, the number of women who received antenatal care (ANC) for their last pregnancy and had an institutional delivery in Uttar Pradesh increased from 44.7% to 72% and from 11.2% to 67.8%, respectively, between 1992 and 2015; however, the existing rich–poor gap (that is, the ratio of the richest to the poorest wealth quintiles) in the use of ANC remained high over the period, while the ratio of institutional deliveries declined (IIPS and Macro International 1995; IIPS and ICF 2017). Similarly, the literacy ratio and the ratio of Scheduled Castes/Scheduled Tribes (SCs/STs) to other castes in the use of ANC has widened over the same period.

Although the proportion of women receiving medical assistance during their delivery in Uttar Pradesh increased from 17.2% in 1992 to 69.6% in 2015, there was a huge gap between poor women and non-poor women in receiving medical assistance. Similarly, in 1992, 11.8% of women who were illiterate or had no education had institutional deliveries versus 75% of those with 10 or more years of schooling. In 2015, this improved to 56% of women with no education and 85.8% of women with 10 or more years of schooling, indicating that though there has been rapid improvement among women with no education,
the gap remains immense (IIPS and Macro International 1995; IIPS and ICF 2017).

Further, a study conducted in 2005–06 also showed that among the babies delivered in health institutions in 2005–06, 31% were born to women with no education and 68.8% to women with 12 or more years of schooling (Mohanty 2012). Likewise, though ANC coverage and the rate of institutional delivery has improved among socially disadvantaged groups such as SCs/STs, progress has been slower compared to other groups.

Several studies have contributed to our understanding of income disparities in maternal healthcare utilisation (Houweling 2007; Mohanty and Pathak 2009; Mohanty 2012). Several studies have analysed demographic and health survey (DHS) data to understand inequalities in access to MCH services across household wealth quintiles after controlling for other social and demographic variables (Hong et al 2006; Ladusingh and Singh 2007; Mohanty and Pathak 2009; Mohanty 2011, 2012). Furthermore, there are other determinants that influence MCH care that have been studied in the context of different Indian states (Ladusingh and Singh 2007). Apart from economic status, several other factors determine vulnerability in access to MCH services, of which social determinants are prominent (Mechanic 2002; Phelan et al 2010; Balarajan et al 2011; Borooah et al 2012). Two important factors—poor education and lower caste—typically exacerbate vulnerability in India and impact the seeking of MCH services (Saroha et al 2008; Gupta et al 2016). Many studies have independently demonstrated the effect of each of these factors on MCH (Goli et al 2013; Mohanty 2012; Borooah et al 2012).

However, very few studies have looked at the effect of multiple vulnerabilities and their interlinkages on the utilisation of health services. For example, a poor woman may also be illiterate or belong to a disadvantaged caste group. The concept of multiple vulnerabilities has gained popularity among both researchers and policymakers because the use of individual-level socio-economic indicators alone may fail to capture health inequalities (Alkire and Foster 2009; Mohanty 2012). Approaches that consider multiple vulnerabilities take into account the effects of individual as well as household-level and contextual disadvantages that impact health.

Equity in health is the absence of systematic disparities in the health (or in the major social determinants of health) of different groups. Knowledge of the aggregate effects of multiple vulnerabilities is needed to shed light on the determinants of growing health inequities. This study aims to shed light on the linkages between multiple vulnerabilities and MCH utilisation in Uttar Pradesh and across its various regions.

**Multiple Vulnerabilities: Issues and Concerns**

Studies on the association between vulnerabilities and health outcomes tend to focus on a single vulnerability—such as income or education—and its linkage with health outcomes. However, in any society, poor people may also have other vulnerabilities, such as lower levels of education or poorer health, or they may be from other socially disadvantaged groups. Those individuals who face more than one vulnerability may be more disadvantaged than those who face a single vulnerability. For example, women from poorer households are more likely to experience adverse health outcomes than those from wealthier households. If those poor women also lack education or if they are from otherwise socially disadvantaged groups, their burden increases and they may be less able to utilise health services than those with only a single vulnerability (Mohanty 2011, 2012). Studies have demonstrated that women who belong to disadvantaged groups are disadvantaged in terms of access to healthcare utilisation of health services as well (Saroha et al 2008; Sen 2011; Mohanty 2012; Prusty et al 2015). Therefore, to address inequalities in healthcare access and service utilisation, we need to apply the lens of multiple deprivations—of wealth, education, class, caste, and regional status.

Disadvantaged groups can be identified in various ways, such as those who are socially disadvantaged, economically disadvantaged, disadvantaged by gender, or geographically disadvantaged. The disadvantaged can also be categorised in three ways—first, at the individual level; second, at the family level or in terms of household characteristics; and third, at the level of their socio-economic group (Brook and Williams 1975).

India is a caste-driven society, and caste plays a significant role in defining its sociopolitical and economic structure. In India's social hierarchy, SCs (namely Dalits) and STs (Adivasis) are the most disadvantaged. There is literature to support the view that social deprivation may affect people more than wealth and health (Saroha et al 2008; Mosse 2018). Among the economic classes, the poor are more deprived in terms of access to public resources than the rich. In India, socio-economic status determines the health status of a particular individual or community (Bhatia et al 2006; Montagu 2011).

An individual or household with a multidimensional vulnerability bears the burden of a cluster of vulnerabilities. There are theoretical and methodological challenges in measuring multiple vulnerabilities, including challenges in contextualising the dimensions and indicators to fix the cut-off point for the “poor” and “non-poor,” the aggregation of multiple dimensions into a single index, weighting of dimensions, and choosing the unit of analysis (Sen 1992; Alkire 2007; Alkire and Foster 2009; Mohanty 2012).

This paper therefore examines the three-dimensional vulnerabilities of wealth, education, and caste and their linkages with the utilisation of MCH services in Uttar Pradesh. Since Uttar Pradesh is a large state, the linkages are also considered for each of its four regions, namely the western region, Avadh (middle), Bundelkhand (south), and Purvanchal (eastern).

Poor performance on socio-economic indicators and uneven development in Uttar Pradesh across its regions and social strata have had a severe impact on the overall health outcomes of the state. Demographic factors also explain the state’s lower health status. Hardly any study has attempted to analyse regional deprivations in terms of utilisation of MCH services in Uttar Pradesh. Though one investigation attempted to understand the overall health outcomes of the state and its regions (Tripathi 2016), it found that there are substantial differences in sociocultural and economic factors that influence individuals’
access to healthcare services across regions. The poor, scs, and otherwise marginalised sections of society suffer immense deprivations that have an impact on their utilisation of MCH services. Further, women's socio-economic status can also influence their utilisation of MCH services across various regions in Uttar Pradesh. Therefore, an estimate of regional deprivations and vulnerabilities and how they have an impact on MCH care is necessary.

Materials and Methods
The data were drawn from the National Family Health Survey (NFHS-4) of 2015–16. The NFHS-4 provides information on reproductive and child healthcare practices in all 71 districts of Uttar Pradesh. The sample included 76,233 households and included information on 97,661 women in the age group 15–49 years and 13,835 men in the age group 15–54 years. The statewide sample size for women who had ever been married was 41,375. The survey provides information on women's demographic and socio-economic characteristics, marriages, fertility, contraception, reproductive health, their children's immunisations, and treatment of childhood illnesses. In this round of the survey, for the first time, district-level information was collected on reproductive and childcare services. In the NFHS-3, all this information was available at only the state and national levels (IIPS and ICF 2007). This study uses NFHS-4 data to assess the current status of service utilisation among disadvantaged groups with multiple dimensions of deprivation in Uttar Pradesh as a whole and across its regions. Only women who were or had been married (“ever-married”) and had given birth in the last five years have been considered for this analysis.

The level and utilisation pattern of MCH services across various regions in Uttar Pradesh has been analysed using the multiple vulnerability approach. The outcome variables considered here are full ANC, institutional delivery, and postnatal care (PNC), which are used as indicators of utilisation of maternal healthcare services. The study considers full immunisation coverage as a child healthcare variable. Descriptive statistics, bivariate analysis, and logistic regression have been used to estimate the degree of their multiple vulnerabilities and the linkages to their pattern of utilisation of MCH services. Results are shown as predicted probabilities, derived from the logistic regression, and the predicted probabilities are adjusted at the mean for all other independent variables.

Measures of Vulnerability
To study the impact of multiple deprivations and vulnerabilities, a variable integrating three dimensions of deprivation—education, wealth, and caste—was constructed; these three dimensions were selected as they were used in the two human poverty indexes and the multidimensional poverty index (which, instead of caste, uses health).

The “low education” category is defined as less than five years of schooling. So, a woman is considered to be deprived or vulnerable in terms of education if she reported in her individual survey that she had not completed five years of schooling. This cut-off was chosen in the survey because people with only a few years of education have been found to have health-seeking behaviours similar to those with no education.

As the NFHS does not collect information on consumption or the income of the household, proxies such as housing quality, household amenities, and consumer durables were used to construct the composite wealth quintile. Those in the lowest wealth quintile have been considered as economically “poor” and the middle, richer, and richest categories as “non-poor.”

For the caste variable, a woman is considered vulnerable if she belongs to a sc or a st.

Based on three mutually interacting variables—education, wealth, and caste—eight categories of vulnerability are possible: deprived in terms of education, wealth, and caste; education and wealth; education and caste; wealth and caste; education only; wealth only; caste only; and none of them. The first four categories represent multidimensional vulnerabilities, the next three pertain to one dimension, and the last category has none of these vulnerabilities. The state-level data is sufficient to show differentials in MCH care for all eight categories of vulnerability/deprivation separately. However, the regional-level data has been issued for only four groups—vulnerable in none of the dimensions, in any one dimension, in any two dimensions, and in all three dimensions.

Dependent Variables

Full antenatal care: In the NFHS-4, the survey 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 and folic acid] tablets/syrup” for a birth in the five years preceding the survey (IIPS and ICF 2017).

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

Postnatal care: Women who had given birth in the 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 health facilities or saw a doctor within two weeks of delivery are considered to have used PNC services.

Full immunisation: A child in the age group of 12–23 months is considered fully immunised if they have received the bccg and measles vaccine and three doses each of the dPT and polio vaccines.

Dimensions of Vulnerabilities in Uttar Pradesh
Table 1 (p 48) presents the proportions of women with different types of vulnerabilities in Uttar Pradesh. The survey found that, in Uttar Pradesh, 57% of women are poor, 47% have low education, and 27% belong to the sc/st category.
Table 1 shows that income vulnerability is lower in the western region, with less than 40% of women belonging to the poor category, whereas poverty levels are above 65% in the other three regions. Educational vulnerability is lower in the Bundelkhand and Avadh regions, but the proportion of SCs/STs in the population is higher in the Avadh and Bundelkhand regions. Overall, considering all the three types of vulnerabilities, the women of the Purvanchal and Avadh regions are more vulnerable, compared to the other two regions.

Table 1: Proportions of Ever-married Women with Different Types of Vulnerabilities in Uttar Pradesh, 2015–16

<table>
<thead>
<tr>
<th>Categories of Vulnerability</th>
<th>Total Uttar Pradesh</th>
<th>Western</th>
<th>Avadh</th>
<th>Bundelkhand</th>
<th>Purvanchal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poor</td>
<td>56.96</td>
<td>39.75</td>
<td>67.3</td>
<td>65.07</td>
<td>66.02</td>
</tr>
<tr>
<td>Low education</td>
<td>47.12</td>
<td>48.1</td>
<td>43.98</td>
<td>36.5</td>
<td>48.45</td>
</tr>
<tr>
<td>SC/ST</td>
<td>26.98</td>
<td>21.3</td>
<td>33.5</td>
<td>31.34</td>
<td>28.63</td>
</tr>
</tbody>
</table>

The sample includes ever-married women in the 15–49 age group.

Source: Authors' calculation based on NFHS-4 (IIPS and ICF 2017).

Table 2 presents the different dimensions of vulnerability in Uttar Pradesh. Overall, 73.4% of ever-married women reported being deprived in at least one respect (education, wealth, or caste). Of the total population, 23.3% were deprived of education and wealth, 31.2% of education and caste, and 12.4% in all three dimensions; 26.6% were not deprived in any dimension at the state level.

Table 2: Proportions of Ever-married Women with Various Dimensions of Vulnerability in Uttar Pradesh, 2015–16

<table>
<thead>
<tr>
<th>Categories of Vulnerability</th>
<th>Uttar Pradesh Total</th>
<th>Western</th>
<th>Avadh</th>
<th>Bundelkhand</th>
<th>Purvanchal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of them</td>
<td>73.36</td>
<td>67.83</td>
<td>76.99</td>
<td>76.01</td>
<td>76.15</td>
</tr>
<tr>
<td>Education and wealth</td>
<td>23.25</td>
<td>20.51</td>
<td>23.29</td>
<td>19.2</td>
<td>25.77</td>
</tr>
<tr>
<td>Wealth and caste</td>
<td>31.16</td>
<td>24.82</td>
<td>35.94</td>
<td>31.37</td>
<td>34.37</td>
</tr>
<tr>
<td>Education and caste</td>
<td>32.76</td>
<td>27.54</td>
<td>37.04</td>
<td>32.61</td>
<td>35.28</td>
</tr>
<tr>
<td>All the three</td>
<td>12.36</td>
<td>6.88</td>
<td>15.34</td>
<td>12.14</td>
<td>15.61</td>
</tr>
<tr>
<td>None</td>
<td>26.57</td>
<td>32.17</td>
<td>22.93</td>
<td>23.96</td>
<td>23.72</td>
</tr>
</tbody>
</table>

Source: Authors' calculation, based on NFHS-4 (IIPS and ICF 2017).

The correlation coefficients of the 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 the 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 proportion of women who do not belong to any of the three vulnerable sections was the highest in the western region. The vulnerability categories of education and wealth, wealth and caste, and education and caste were also smallest in the western region. Overall, the data show that there are variations in vulnerability levels across the four regions of Uttar Pradesh.

Table 3 shows the distribution of women across the dimensions of vulnerability in Uttar Pradesh and its regions. Overall, 27% of the women in Uttar Pradesh do not face any type of vulnerability, and 12% have all the three vulnerabilities. Women with any one or two vulnerabilities made up 28% and 33%, respectively. Regional variations in levels of vulnerability show that multiple vulnerabilities are more common in the Purvanchal and Avadh regions than in the western and Bundelkhand regions.

Table 3: Distribution of Ever-married Women by Dimensions of Vulnerability across Uttar Pradesh, 2015–16

<table>
<thead>
<tr>
<th>Categories of Vulnerability</th>
<th>Uttar Pradesh and Its Regions</th>
<th>Dimensions of Vulnerability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>None</td>
<td>One</td>
</tr>
<tr>
<td></td>
<td>Whole state</td>
<td>Western region</td>
</tr>
<tr>
<td></td>
<td>26.64</td>
<td>32.82</td>
</tr>
<tr>
<td>Western region</td>
<td>32.18</td>
<td>33.4</td>
</tr>
<tr>
<td>Avadh</td>
<td>22.96</td>
<td>24.59</td>
</tr>
<tr>
<td>Bundelkhand</td>
<td>23.97</td>
<td>31.27</td>
</tr>
<tr>
<td>Purvanchal</td>
<td>23.85</td>
<td>24.98</td>
</tr>
</tbody>
</table>

Source: Authors' calculation based on NFHS-4 (IIPS and ICF 2017).

Table 4 represents the utilisation of mch services among all ever-married women who had at least one live birth in the five years preceding the survey, categorised by 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 full ANC coverage in the state is quite low—14% even for those women with no deprivation. As compared to 1.7%–3% of the population being deprived in any one dimension, 1.1%–1.3% are deprived in two dimensions, and 0.8% are deprived in all three dimensions. Similarly, the proportion of women with no ANC was only 9% when there was no deprivation, while this proportion increased to 40% when they are deprived in all three dimensions.

The level of receiving institutional delivery is similar to that of full ANC service utilisation. Of the live births of ever-married women in the previous five years, the proportion of deliveries
in health facilities was 83% among those women who are not vulnerable in any of the three dimensions, compared with 55% among those women who are vulnerable in all three dimensions. Further, our findings show that with an increase in the dimensions of vulnerability, the proportion of institutional deliveries decreases. Among women deprived in one dimension, the proportion of births that took place in health facilities was the lowest for those deprived of education (56.5%), followed by those deprived of wealth (61.4%), and those deprived by caste (64.4%); among women deprived in two dimensions, the proportion of births that took place in health facilities was the lowest among those deprived of education and wealth (54.8%), followed by those deprived in terms of education and caste (56.2%). Those deprived of wealth and caste status had the highest proportion of institutional births (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% as we move from the category of no deprivation to being deprived in all three dimensions.

The pattern of utilisation for PNC is similar to that of the other two indicators. The proportion of women who received PNC was higher among those with no deprivations or vulnerabilities than among those facing deprivations in all three dimensions (75.2% versus 49.7%). Among those deprived in one dimension, women deprived of wealth (53.9%) were less likely to receive PNC than those deprived of education (54.2%) or from a lower caste (57.2%); among those deprived in two dimensions, the proportion receiving PNC varied from 50% for those deprived of education and wealth to 52% for those deprived in terms of education and caste and 53% for those deprived of wealth and caste status.

Full immunisation coverage of children (12–23 months) was highest among mothers with no deprivations (60%) and lowest among those experiencing deprivation in all three dimensions (41%). Among those deprived in one dimension, the proportion of women whose children received full immunisation was lower for those deprived of education (43%) than for those deprived of wealth (45%) or caste status (57%); among those deprived in two dimensions, the proportion whose children received full immunisation varied from 39% for those deprived of education and wealth, to 45% for those deprived of education and caste status, and 44% for those deprived in terms of wealth and caste.

Differences in women’s utilisation of full ANC services across the regions in Uttar Pradesh are explored below. The utilisation of full ANC services vary across the four regions. Full ANC coverage ranged from 2.9% in Bundelkhand to 7.6% in the western region (Table 5), and institutional delivery at health facilities ranged from 82% in Bundelkhand to 66% in the western region (Table 6). Utilisation of MCH services also varied remarkably across dimensions of deprivation/vulnerability across regions, generally decreasing with an increased level of deprivation.

Table 6: Proportions of Institutional Delivery, Categorised by Dimensions of Vulnerability and the Ratios of Vulnerability, across Uttar Pradesh, 2015–16 (%)

<table>
<thead>
<tr>
<th>Region</th>
<th>Dimensions of Vulnerability</th>
<th>Ratio of None to One/ Two/Three Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>None</td>
</tr>
<tr>
<td>All of Uttar Pradesh</td>
<td>67.93</td>
<td>82.83</td>
</tr>
<tr>
<td>Western region</td>
<td>65.68</td>
<td>80.17</td>
</tr>
<tr>
<td>Avadh</td>
<td>68.54</td>
<td>84.67</td>
</tr>
<tr>
<td>Bundelkhand</td>
<td>81.79</td>
<td>90.6</td>
</tr>
<tr>
<td>Purvanchal</td>
<td>68.31</td>
<td>84.37</td>
</tr>
</tbody>
</table>

Source: Authors’ calculation based on NFHS-4 (IIPS and ICF 2017).

For example, in the Avadh region, the proportion of women who received full ANC and the proportion of women who had institutional deliveries were greater in the category with no deprivations (12.2% and 84.7%, respectively) 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 the western, Purvanchal, and Bundelkhand regions, increasing deprivation levels correlated with decreased utilisation of MCH services. To understand this better, the inequality in the utilisation of MCH care across different groups has been calculated as the ratio of service utilisation of women not deprived in any dimension to that of women deprived in one, two, or three dimensions; the closer the ratio is to 1.0, the lower the inequality is between the groups.

For ANC, the ratio of women deprived in no dimension to those deprived in one was highest in Bundelkhand (4.8) followed by Avadh (3.8); the lowest ratios were seen in Purvanchal (3) and the western region (3.4). For higher levels of deprivation, the ratios were substantially higher in all regions, ranging from 4.3 to 9.9 for two dimensions and from 7.3 to 26.5 for three dimensions. For institutional delivery care, the ratio of women deprived in no dimension to those deprived in one was the highest in the western region (1.3), with Avadh, Bundelkhand, and Purvanchal all at 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.

The differences in PNC coverage across deprivation groups were similar to those for institutional delivery (Table 7). Regions with low usage of ANC also had low usage of PNC. However, the use of PNC differed across regions, ranging from...
56% in Purvanchal to 73% in the western region (Table 7), while full immunisation ranged from 35% in Purvanchal to 47% in the western region (Table 8). The proportion of women who received PNC and full immunisation for their children was highest among the group with no deprivations—for PNC, ranging from 62% in Bundelkhand to 81% in the western region; for full immunisation, it ranged from 43% in Purvanchal to 53.3% in the western region.

Probabilities for each of the four MCH outcomes indicators have been estimated (Figure 1), adjusting for other social and demographic factors, such as the age of the mother, place of residence, region, religion, and birth order. The predicted probability of women receiving full ANC at each level of vulnerability is lower than that for full immunisation, 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 receive ANC (predicted probability 0.008 versus 0.14), full immunisation (0.4 versus 0.6), PNC (0.5 versus 0.8), and institutional delivery (0.5 versus 0.8). In addition, the probability of each outcome is the lowest among those deprived in all three dimensions, followed by those deprived in terms of education and wealth, education and caste, education only, caste and wealth, wealth only, caste only, and in no dimension, in that order. For example, the predicted probability of institutional delivery was 0.55 for women deprived in all three dimensions, 0.55 for women deprived of education and wealth, 0.60 for those women deprived of education and caste status, 0.59 for women deprived of wealth and caste status, and 0.83 for those women not deprived in any dimension. Overall, a single level of deprivation, education, appears to have a stronger influence than caste only or wealth only. After adjusting for confounding factors, women deprived in terms of education alone were less likely to use MCH services, such as full ANC, PNC, institutional delivery, and full immunisation than those deprived of both wealth and caste.

For PNC and full immunisation, the ratios for women deprived in no dimension to those deprived in one are the highest, and it substantially increases for greater vulnerability across two and three dimensions. This follows a similar pattern as institutional delivery, PNC, and full immunisation alone, and also the ratios of no deprivation to deprivation in one, two, and three dimensions are similar. Across regions, the highest inequality is seen in the western region across the different dimensions of deprivation and the lowest in Bundelkhand.

Through this analysis, the Purvanchal region has been found to be the worst disadvantaged region in Uttar Pradesh, followed by Avadh, Bundelkhand, and the western region. The intensity and volume of inequality are high in the western region, within and across the deprivation groups.

A set of binary logistic regressions was applied to examine the association between the level of vulnerability and utilisation of MCH care services, controlling for social and demographic covariates in Uttar Pradesh and across its various regions. Results are shown as adjusted predicted probabilities at the mean of all other independent variables (Table 9). In general, the multivariate analysis supports the results of the bivariate analyses. It shows that the probability of using each of the MCH services decreases with increasing levels of vulnerability. For example, in the Bundelkhand region, the probability of receiving full ANC 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 the Purvanchal region, the probability of birth in a hospital is 0.83 among those not deprived in any dimension, 0.7 among those deprived in one dimension, 0.6 among those

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**Table 8: Distribution of Children Who Received Full Vaccination, Categorised by Dimensions of Vulnerability and Ratios of Vulnerability, across Uttar Pradesh, 2015–16 (%)**

<table>
<thead>
<tr>
<th>Region</th>
<th>Dimensions of Vulnerability</th>
<th>Ratio of None to One/Two/Three Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>All</td>
<td>None</td>
</tr>
<tr>
<td>All of Uttar Pradesh</td>
<td>51.62</td>
<td>60.81</td>
</tr>
<tr>
<td>Western region</td>
<td>61.13</td>
<td>68.06</td>
</tr>
<tr>
<td>Avadh</td>
<td>51.1</td>
<td>57.61</td>
</tr>
<tr>
<td>Bundelkhand</td>
<td>58.52</td>
<td>61.9</td>
</tr>
<tr>
<td>Purvanchal</td>
<td>43.62</td>
<td>53.78</td>
</tr>
</tbody>
</table>

*Sample size is not supporting the analysis.

Source: Authors’ calculation based on NFHS-4 (IIPS and ICF 2017).
deprived in two dimensions, and 0.5 among those deprived in all three dimensions.

**Conclusions and Policy Implications**

Overall, this study highlights some interesting linkages between multiple vulnerabilities and the utilisation of MCH services in Uttar Pradesh and across 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 are less likely to have access to essential MCH services.

The use of MCH services—full ANC, institutional delivery, PNC, and full immunisation—is found to vary significantly among women in Uttar Pradesh, according to their levels of deprivation/vulnerability. Overall, the utilisation of MCH services declines with increasing levels of deprivation. Educational vulnerability appears to have a larger impact, compared to other types of vulnerabilities, such as caste and wealth, on the utilisation of MCH services. The utilisation of MCH services also varies across regions and across socio-economic groups in the state. Women from the Purvanchal region appear to have an especially low level of MCH service utilisation, followed by Avadh and Bundelkhand, and in all the regions, there exists inequality in service utilisation. Hence, there needs to be a special focus on addressing issues, such as low access to and underutilisation of MCH services in Uttar Pradesh and its various regions.

In general, the differences between those with multiple deprivations and those with none appear to be greater in regions where service coverage is already low; the differences are lesser in regions where service coverage is high. Such differences may arise from variances in the availability, accessibility, and quality of care in public health centres. Actions to address these inequities in MCH services as well as to ensure access to general healthcare should be comprehensive and based on a multisectoral approach.

**REFERENCES**


Reading India, volumes 1, 2, and 3 commemorate 50 years of the EPW by bringing together a selection of articles from 1949 to 2017. This series brings together landmark studies in sociology, politics, and economics along with research on the environment, health, education, censorship, and free speech.

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