Original Article

Assessing universal maternal health service coverage and their determinants in India: A multicentric cross-sectional study

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ABSTRACT

Introduction: Universal maternal health coverage (UHC) envisages access to quality healthcare services by pregnant and lactating women without any financial hardship. Our present study attempts to assess the UHC for maternal health services and their determinants, including access to quality antenatal care (ANC), quality postnatal care (PNC), and child immunization among the marginalized populations of India. **Methods:** It was a community-based cross-sectional study across five states of India among pregnant or lactating women. Quality ANC score was calculated using four indicators, including ANC registration month, attendance of four or more ANC visits, receiving at least one tetanus toxoid injection, and consumption of 100 iron-folic acid (IFA) tablets. Similarly, quality PNC care score was calculated using four indicators, including PNC within 48 h, breastfeeding initiation time, institutional delivery, and accessing conditional maternity benefit scheme. Logistic or generalized linear regression was used to depict associations depending on the outcome variables. **Results:** A total of 12,976 pregnant women's and 18,061 lactating mothers' data were analyzed. Illiterate women, women from below the poverty line, and rural areas had low-quality ANC and PNC scores compared with their counterparts. Marginalized women had lower odds of immunization of children and lower quality PNC scores than nonmarginalized. **Conclusions:** Sociodemographic factors, such as caste, education of women, area of residence, and economic status, are major determinants of quality ANC and PNC scores and immunization of children. Hence, interventionists ought to design community-based interventions that address the challenges in the uptake of health services.

Keywords: Child, immunization, maternal health, prenatal care

Introduction

Maternal health, defined as the health of women during pregnancy, childbirth, and the postnatal period, is fundamental to a nation's growth and prosperity. Investment in maternal health is critical to broader societal returns for the country.[1] Sustainable Development Goals 3 and 5 count the outcomes of good maternal health, including reduced maternal mortality, improved access to sexual and reproductive healthcare, and empowerment of women in all spheres.[2] The global maternal mortality declined by 38%, i.e., from 342 to 211 deaths per 100,000 live births in 17 years (2007–2017). The biggest contribution to this decline in global maternal mortality was made by South Asian countries.[3] India, too witnessed, a sharp decline in maternal mortality from 130 in 2014–2016 to 113 in 2016–2018 per 100,000 live births.[4]

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Quality antenatal care (ANC) and postnatal care (PNC) provide opportunities for positive pregnancy experiences and improved maternal survival.[5] However, there is a huge gap in the access to these services and maternal care during and after pregnancy in India. This is evident from the recent National Family Health Survey (NFHS-5) reporting access to four ANC visits by 50%–77% of women only and consumption of 180 iron-folic acid (IFA) tablets by <50% of women in states like Maharashtra, Assam, Gujarat, and Karnataka. Worst among all, the states like Bihar had only 25% of women completing four or more ANC visits and <10% of women consuming 180 or more IFA tablets. These health indicators are further poor among backward or vulnerable sections of society.[6]

Universal maternal health coverage (UHC) envisages access to quality healthcare services by pregnant and lactating women without any financial hardship. Achieving UHC is increasingly been recognized as the national agenda and a step toward SDG 2030. However, assessing maternal health indicators in terms of UHC is still in its nascence in low- and middle-income countries like India. The UHC includes three domains, primarily service, financial, and population coverage. UHC calls for equitable access to services irrespective of race, religion, caste, and gender.[7] The NITI Ayog, think tank of India, spearheads the health index initiative to measure the progress of states toward SDG-2030. The Ayog highlighted that several states made good progress toward achieving SDG goals. However, the backward states like Uttar Pradesh, Bihar, and Rajasthan are far behind the developed states like Kerala and are in the bottom one-third of the ranking of the states based on the composite performance index of health indicators.[8]

Several attempts have been made to measure UHC by creating composite indices globally and in India.[9-11] Various arithmetic or geometric methods have been used to aggregate individual indicators for generating composite indices. The choice of individual indicators is influenced by the country's affordability to provide services to the entire population and the availability of the data.[11] The Millennium Development Goals (MDG) Countdown Research Group constructed composite indices by selecting service coverage indicators of maternal and child care across 54 countries.[12] Similarly, another study generated a composite index using service coverage indicators of 103 countries.[10] Most of these studies included indicators of ANC, PNC of mother, child immunization, and contraceptive prevalence rate.[10-12]

Our present study attempts to assess the UHC for maternal health services and their determinants, including access to quality ANC, quality PNC, and child immunization among the marginalized populations of the backward states of India.

Materials and Methods

Study site, design, and sampling

The present study was conducted in five states and union territories. We employed multistage random sampling for this cross-sectional study. Two blocks/assembly constituencies per district were chosen randomly for data collection. In each block, primary sampling units were selected, which were villages in the rural areas and wards in the urban areas. The villages were ranked in the order of the highest percentage of marginalized populations (scheduled castes/tribes/other backward populations) using the district-level census data published by the Registrar General of India. The top 50–60 villages with the highest population of marginalized segments were chosen per block in the rural areas. Similarly, four to five wards per block with the highest proportion of marginalized populations were selected in the urban areas. In the second stage, households were selected with the help of frontline workers (Accredited Social Health Activists [ASHA]/Anganwadi Workers [AWW]). The list of the households with pregnant and lactating women was obtained from the frontline workers. Visits were made to the households of the women by the field team.

Data were collected by female investigators across all the districts. The investigators were trained on the questionnaire and data collection techniques. The data were collected in the local language on papers, which were later entered into an online management information system in English.

Study inclusion and exclusion criteria

All ever-married women (15–49 years) who were pregnant or lactating at the time of the survey were eligible for the study. The participants were eligible if they had been living in the area for the past 6 months at least. Those women who did not provide consent or could not answer the questions on their own were excluded.

Outcome variables

Our choice of outcome variables as indicators for UHC service coverage was based on the previous literature and availability of data.[11,13] The outcome variables included quality ANC and PNC, use of *Anganwadi* center during pregnancy and lactation period, complete immunization of children with basic vaccines, and postpartum contraceptive uptake. We calculated quality ANC score using four indicators, including ANC registration month, attendance of four or more ANC visits, receiving at least one tetanus toxoid injection, and consumption of 100 IFA tablets. Registration within the first trimester, receipt of four ANC visits, receipt of at least one tetanus toxoid, and consumption of 100 IFA tablets were scored 1 and other options 0. The scores of all four indicators were summed up to calculate the quality ANC score. The score values ranged between 0 and 4. The item-total correlation for the scale ranged between 0.18 and 0.22.

Similarly, quality PNC score was calculated using four indicators, including PNC within 48 h, breastfeeding initiation time, institutional delivery, and accessing conditional maternity benefit scheme.[11] PNC of both mother and child within 48 h of delivery, breastfeeding initiation within 1 h of birth, institutional delivery, and accessing conditional maternity benefit scheme were scored

1 and the other options were scored 0. The scores of all the indicators were summed up to calculate PNC score. The score values ranged between 0 and 4. The item-total correlation score ranged between 0.16 and 0.42. The complete immunization with basic vaccines included Bacillus Calmette Guerin (BCG), Oral polio vaccine (OPV; zero, first, second, and third dose), Hepatitis B (zero dose), Inactivated Polio vaccine (IPV), Pentavalent (first, second, and third dose), measles, and vitamin A (first dose). Use of contraceptives postdelivery included condom, oral pills, intrauterine device (IUCD), male or female sterilization, and others, such as depo-medroxyprogesterone acetate, or nonsteroidal contraceptives. The visit to *Anganwadi* center during pregnancy and lactation was a dichotomous variable. *Anganwadi centers* are maternal and child care centers where pregnant and lactating women receive supplementary food, health education, and iron-folic acid tablets.[12]

Explanatory variables

The explanatory variables included sociodemographic determinants for pregnant and lactating women. This included religion (Hindu, Muslim, or others), caste (general or non-marginalized, other backward classes, or scheduled castes/tribes), education status of women (illiterate, primary, secondary, or graduation and above) economic status (below the poverty line or above the poverty line), and study areas (rural or urban). Below the poverty line (BPL) status of participants was assessed based on the availability of BPL or *Antayodya Anna Yojna* (extremely poor) cards, and participants with above the poverty cards or no cards were grouped as above the poverty line.

In addition, data on age of women, monthly family income (<5,000, 5,001–10,000, or >10,000 Indian Rupees) and source of income (agriculture, daily wager, service, or others) was calculated but not included in the regression analysis.

Statistical analysis

Descriptive statistics were obtained for sociodemographic and outcome variables of pregnant and lactating women, separately. Quantitative variables were expressed as mean (± standard deviation) and categorical as frequency (percentage). Unadjusted and adjusted regression analysis was performed to assess associations between explanatory and outcome variables. For regression analysis, the number of categories of the education status of women was reduced to four (illiterate, primary, secondary, and graduation and above), where primary and upper primary, and secondary and senior secondary were clubbed together. The general linear model of regression was employed to investigate the relationship of quality ANC and PNC scores with explanatory variables using main effects analysis. Standard regression coefficients (β) and 95% confidence intervals were used to depict the strength of and precision of associations. All the quantitative variables were normally distributed. Similarly, logistic regression analysis was performed with dichotomous outcome variables (visit to *Anganwadi* centers during pregnancy and lactation period, complete immunization

of children with basic vaccines, and postpartum contraceptive uptake). The strength and direction of association were expressed as odds ratio (OR) and 95% CI for logistic regression models. *P* value < 0.05 was considered as a criterion for statistical significance. Data analyses were performed with the IBM SPSS Statistics for Windows version 27.0 (IBM Corp., Armonk, N.Y., USA).

Ethics

The ethical clearance for the study questionnaires was granted by the Institutional Ethical Review Board. We obtained consent from women after explaining the objectives of the study.

Results

A total of 12,976 pregnant women's and 18,061 lactating mothers' data were analyzed. The mean (± SD) age of pregnant and lactating women at the time of survey were 23.7 (±3.4) and 24.6 (±3.4) years [Table 1]. Eighty-three percent of pregnant and lactating women were Hindu. Nearly one-fifth of lactating women and one-fourth of pregnant women were illiterate. Approximately 88% of pregnant and lactating women visited *Anganwadi* centers for supplementary foods.

The results of this study showed that nearly three-fourths of pregnant women registered pregnancy within the first trimester. However, only 34% completed four ANC visits, as shown in Table 2. Seventy-two percent and 78% of lactating women received PNC for both mother and child and initiated breastfeeding within an hour of birth, respectively. Around 64% of children received basic vaccines and 92% delivered in institutions.

In the unadjusted analysis, lactating women from the nonmarginalized category had 1.25 times higher odds of adopting contraceptives postpartum (OR [95%CI]: 1.258 [1.148, 1.378]) and 45% lower probability of visiting *Anganwadi* centers (OR [95%CI]: 0.554[0.489, 0.627]) compared with women in the scheduled castes/tribe category [Table 3]. Similarly, illiterate pregnant women had an average 0.144 decrease in the quality ANC score and 0.287 decrease in the quality PNC score compared with women who were graduated. Women belonging to BPL category had an average 0.04 decrease in the quality ANC score and 0.141 decrease in the quality PNC score compared with women above the poverty line [Table 3].

In the adjusted analysis, most of the associations remained significant. Women from the rural areas had an average 0.436 decrease in the quality ANC score compared with women from the urban areas [Table 4]. Similarly, BPL women had an average 0.07 decrease in the quality ANC score compared with the women from above the poverty line. On the contrary, rural women and BPL women had 2.9 and 1.3 higher odds of visiting *Anganwadi* centers than their counterparts, respectively. Illiterate women had lower odds of immunization of under-5 (OR [95%CI]: 0.867 [0.769, 0.979]), and postpartum

Table 1: Sociodemographic variables of pregnant and lactating mothers		
Variables	Pregnant women (*n*=12,976) *n* (%)	Lactating mothers (*n*=18,061) *n* (%)
Age at the time of the interview; mean (±SD)	23.7 (±3.4)	24.6 (±3.4)
Missing	89	152
Religion		
Hindu	10,769 (83.0)	14,975 (82.9)
Muslim	1,239 (9.5)	1,695 (9.4)
Others*	968 (7.5)	1,391 (7.7)
Caste		
General	1,569 (12.1)	2,403 (13.3)
Other backward classes	5,675 (43.7)	7,518 (41.6)
Scheduled caste	5,381 (41.5)	7,613 (42.2)
Scheduled tribe	351 (2.7)	527 (2.9)
Economic status		
Below poverty line	5,716 (44.0)	8,397 (46.5)
Above poverty line	7,260 (56.0)	9,664 (53.5)
Education status		
Illiterate	2,795 (21.5)	4,644 (25.7)
Primary	2,640 (20.3)	3,489 (19.3)
Upper primary	2,819 (21.7)	3,655 (20.2)
Secondary	2,001 (15.4)	2,757 (15.3)
Senior secondary	1,352 (10.4)	1,818 (10.1)
Graduation and above	1,369 (10.6)	1,698 (9.4)
Source of family income		
Agriculture	3,847 (29.6)	4,571 (25.3)
Daily wager	6,949 (53.6)	10,186 (56.4)
Service	1,109 (8.5)	2,016 (11.2)
Others	1,071 (8.3)	1,288 (7.1)
Monthly family income (Indian Rupees)		
≤5,000	6,244 (48.1)	8,772 (48.6)
5,000-10,000	5,847 (45.1)	8,086 (44.8)
>10,000	885 (6.8)	1,203 (6.7)
Type of area		
Rural	11,220 (86.5)	14,559 (80.6)
Urban	1,756 (13.5)	3,502 (19.4)
Visit to *Anganwadi* center (supplementary food)		
Yes	11,382 (87.7)	15,933 (88.2)
No	1,594 (12.3)	2,128 (11.8)

*Others include Sikhs, Parsi, Jains, Buddhists, and Christians; Others include business, unemployed members. SD, standard deviation

contraceptive uptake (OR [95%CI]: 0.698 [0.621, 0.784]) than the graduated women.

Discussion

Our results are representative of the health situation of marginalized Hindus from rural areas, primarily, as 87%–88% of participants belonged to marginalized classes (OBC/Scheduled Castes/Scheduled Tribes), and 83% were Hindus. In our study, 87%–77% of women visited *Anganwadi* centers, which is higher than reported in other studies.[14,15] The difference in findings mounts to various factors, including the difference in the proportion of marginalized, economically weaker, or rural populations in the study sample size. However, a similar study with a big sample size and nearly 80% marginalized population reported utilization of *Anganwadi* services by 55% pregnant women only.[5] This contrast is due to the dissimilarity in the question, as we asked only about the visit, whereas the other

study specified the receipt of services. Evidence suggests that women visiting *Anganwadi* centers may not receive services, such as supplementary foods, due to lack of resources, poor quality of foods, poor infrastructure, and absence of staff at centers.[16,17]

Quality of care has consistently been argued to be an important determinant in deterring maternal mortality and morbidity; however, it has been inconsistently addressed in studies. Quality ANC results in better perinatal and postnatal outcomes.[18] Our choice of factors for quality ANC or PNC was based on the previous studies.[11,19,20] According to the NFHS-4, around 51% of women had four or more ANC in India, and this figure was as low as 14% and 26% in the state of Bihar and Uttar Pradesh, respectively. Similarly, 58% of women in India had their first ANC visit within the first trimester. However, only 34% of women in Bihar and 49% in Uttar Pradesh had ANC visits within the first trimester.[6] Our findings are lower than the national average for four or more ANC visits but higher than the national

Table 2: Distribution of antenatal and postnatal characteristics			
Antenatal characteristics	**Pregnant women (n=12976) n (%)**	**Postnatal characteristics**	**Lactating women (n=18061) n (%)**
Quality ANC care		**Postnatal maternal and child care**	
Registration month		PNC checkup within 48 h	
Withing first trimester	9,661 (74.5)	Both mother and child	13,068 (72.4)
Second trimester	2,800 (21.7)	Mother only	751 (4.2)
Third trimester	85 (0.7)	Child only	372 (2.1)
Do not remember	414 (3.2)	None	3,870 (21.4)
Did not register	16 (0.1)	Breastfeeding initiation	
Mothers who had four or more ANC visits		Within 1 h	14,086 (78.0)
Yes	4,435 (34.2)	Within 24 h	2,673 (14.8)
No	8,541 (65.8)	After 24 h	1,152 (6.4)
		Not at all	150 (0.8)
Had at least one TT injection		JSY scheme	
		Yes	11,745 (65.0)
Yes	12,181 (93.9)	No	6,316 (35.0)
No	795 (6.1)	Institutional delivery	
Consumption of IFA tablets		Yes	16,566 (91.7)
<100	9,362 (72.1)	No	1,495 (8.3)
100 or more	1,439 (11.1)	Children covered with all the basic vaccines	
Do not remember	2,175 (16.8)	Yes	11,658 (64.5)
		No	6,403 (35.5)
		Used contraceptive after delivery	
		Condom	5,587 (30.9)
		Pill	691 (3.8)
		IUCD	666 (3.7)
		Others	260 (1.4)
		Not used any	10,138 (56.1)
		Male sterilization	45 (0.2)
		Female sterilization	674 (3.7)

ANC, antenatal care; IFA, iron-folic acid; IUCD, intrauterine device; PNC, postnatal care; TT, tetanus toxoid

average for first-trimester registration. This reflects that women did register initially for the ANC visits but did not complete all the visits either due to migration to their parents' house or other areas. This is supported by evidence from other studies.[21]

Our findings for consumption of 100 IFA tablets and 2 TT injections are similar to the national health survey findings, suggesting low IFA consumption (<12%) among women during pregnancy.[6] Around two-thirds of women had PNC within 2 days of delivery in India, whereas only 46% had it in Bihar and 59% in the state of Uttar Pradesh. Likewise, in our study, around 72% of women had PNC within 2 days of delivery. Within an hour of birth, nearly three-fourths of women had started breastfeeding in our study, which is very high compared with the national data. This could be attributed to the higher percentage of women accessing PNC in our study compared with the national data. Likewise, all other PNC indicators (child immunization, institutional delivery, contraceptive uptake) in our study are similar to those reported in the national data.[6]

Congruent to other studies, we found that maternal education is an important determinant of maternal health services and contraceptive uptake.[5,19] Maternal education helps women gain self-confidence, efficacy, and decision-making power to access

these services, besides improving their probability to the job and hence, financial empowerment.[22] Illiterate women had lower quality ANC and PNC scores, contraceptive uptake, and under-5 immunization compared with women who were graduates in our study.

Likewise, women from marginalized communities, rural areas, and poor socioeconomic strata have a lower probability of quality ANC and PNC uptake than their counterparts in other studies.[5,19] The government initiated conditional maternity benefit schemes, such as *Janani Suraksha Yojna* and *Pradhan Mantri Matru Vandana Yojna*, etc., to promote ANC and PNC as well as institutional delivery among socially and economically marginalized women. The schemes have proved effective in improving institutional delivery and reducing maternal mortality.[23,24]

We found that Hindu women from the marginalized communities, BPL category, and rural areas had a higher odd of visiting *Anganwadi* centers for the uptake of services during and after pregnancy. This is supported by other studies as women from poor family's access *Anganwadi* for food compared with women with a well-to-do background. Besides, the studies emphasized the need to improve the decision-making power of women for increased access to services.[25,26]

Table 3: Unadjusted regression analysis between five outcomes and sociodeterminants using logistic and generalized linear regression

Variables	Unadjusted regression β (95% CI)		Unadjusted odds ratio (95% CI)		Unadjusted odds ratio (95% CI)	
	Quality ANC	Quality PNC	Use of AWC during pregnancy	Use of AWC during lactating period	Immunization of under-5 with basic vaccines	Postpartum contraceptive uptake
Religion						
Hindu	0.047 (−0.007, 0.101)	−0.055 (−0.110, 5.2×10⁵)	**1.996 (1.688, 2.361)¶**	**1.443 (1.234, 1.688)¶**	**1.273 (1.138, 1.424)¶**	**0.567 (0.507, 0.633)¶**
Muslim	−0.024 (−0.093, 0.045)	**−0.461 (−0.538, −0.396)¶**	**1.465 (1.174, 1.829)***	**0.803 (0.662, 0.974)§**	1.092 (0.945, 1.263)	**0.414 (0.358, 0.479)¶**
Others*	Reference	Reference	Reference	Reference	Reference	Reference
Caste						
General	**0.168 (0.122, 0.214)¶**	−0.014 (−0.060,0.031)	**0.682 (0.585, 0.795)¶**	**0.554 (0.489, 0.627)¶**	**0.907 (0.825, 0.997)§**	**1.258 (1.148, 1.378)¶**
OBC	−0.020 (−0.051, 010)	**−0.037 (−0.069, −0.006)§**	**1.132 (1.009, 1.269)§**	1.035 (0.935, 1.145)	**0.915 (0.857, 0.977)***	**0.758 (0.711,0.808)¶**
SC/ST	Reference	Reference	Reference	Reference	Reference	Reference
Education status						
Illiterate	**−0.144 (−0.197, −0.091)¶**	**−0.287 (−0.343, −0.232)¶**	0.999 (0.818, 1.221)	0.939 (0.795, 1.110)	**0.870 (0.774, 0.978)§**	**0.674 (0.603, 0.754)¶**
Primary	0.007 (−0.041, 0.056)	0.003 (−0.050, 0.055)	0.885 (0.738, 1.061)	**1.277 (1.085, 1.502)***	**0.857 (0.767, 0.959)***	**0.717 (0.644, 0.797)¶**
Secondary	**0.052 (0.0, 0.104)§**	0.015 (−0.041,0.070)	1.044 (0.858, 1.269)	1.011 (0.855, 1.196)	1.026 (0.911, 1.154)	0.988 (0.884, 1.104)
Graduation+	Reference	Reference	Reference	Reference	Reference	Reference
Economic status						
BPL	**−0.044 (−0.072, −0.015)¶**	**−0.141 (−0.171, −0.112)¶**	**1.182 (1.063, 1.315)***	1.009 (0.922, 1.105)	**0.888 (0.835, 0.944)¶**	1.016 (0.958, 1.078)
APL	Reference	Reference	Reference	Reference	Reference	Reference
Type of areas						
Rural	**−0.421 (−0.462, −0.380)¶**	**0.247 (0.210, 0.284)¶**	**2.882 (2.545, 3.262)¶**	**2.568 (2.328, 2.833)¶**	**0.883 (0.817, 0.955)***	**0.533 (0.495, 0.575)¶**
Urban	Reference	Reference	Reference	Reference	Reference	Reference

¶P≤0.001; ‡‡P<0.01; §P<0.05. ANC, antenatal care; AWC, Anganwadi center; API, above the poverty line; BPL, below the poverty line; CI, confidence interval; OBC, other backward classes; SC/ST, scheduled castes/scheduled tribes

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Table 4: Adjusted regression analysis between five outcomes and sociodemographic determinants using logistic and generalized linear regression

Variables	Adjusted regression β (95% CI)		Adjusted odds ratio (95% CI)		Adjusted odds ratio (95% CI)	
	Quality ANC	Quality PNC	Use of AWC during pregnancy	Use of AWC during lactating period	Immunization of under-5 with basic vaccines	Postpartum contraceptive uptake
Religion						
Hindu	**0.122 (0.068, 0.176)¶**	**−0.056 (−0.111, −0.001)§**	**1.702 (1.431, 2.025)¶**	**1.218 (1.036, 1.432)§**	**1.390 (1.239, 1.558)¶**	**0.644 (0.575, 0.723)¶**
Muslim	−0.013 (−0.084, 0.057)	**−0.368 (−0.441, −0.295)¶**	**1.545 (1.217, 1.962)¶**	0.829 (0.674, 1.019)	**1.255 (1.078, 1.461)***	**0.469 (0.402, 0.546)¶**
Others*	Reference	Reference	Reference	Reference	Reference	Reference
Caste						
General	0.026 (−0.021, 0.074)	**0.083 (0.034, 0.132)¶**	0.926 (0.784, 1.095)	**0.838 (0.728, 0.964)§**	**0.795 (0.716, 0.882)¶**	0.987 (0.892, 1.092)
OBC	−0.017 (−0.049, 0.015)	**−0.059 (−0.092, −0.026)¶**	1.109 (0.979, 1.257)	1.007 (0.902, 1.123)	**0.894 (0.833, 0.959)***	**0.797 (0.744, 0.853)¶**
SC/ST	Reference	Reference	Reference	Reference	Reference	Reference
Education status						
Illiterate	**−0.108 (−0.162, −0.054)¶**	**−0.259 (−0.316, −0.203)¶**	0.888 (0.721, 1.095)	0.850 (0.714, 1.011)	**0.867 (0.769, 0.979)§**	**0.698 (0.621, 0.784)¶**
Primary	0.013 (−0.036, 0.061)	0.042 (−0.011, 0.095)	0.889 (0.737, 1.073)	**1.304 (1.103, 1.540)***	**0.856 (0.765, 0.959)***	**0.718 (0.644, 0.801)¶**
Secondary	0.018 (−0.033, 0.069)	**0.077 (0.023, 0.133)***	1.180 (0.966, 1.442)	**1.203 (1.013, 1.429)§**	1.022 (0.907, 1.151)	0.899 (0.802, 1.007)
Graduation+	Reference	Reference	Reference	Reference	Reference	Reference
Economic status						
BPL	**−0.074 (−0.103, −0.044)¶**	**−0.089 (−0.119, −0.060)¶**	**1.338 (1.194, 1.499)¶**	1.095 (0.997, 1.204)	**0.857 (0.805, 0.913)¶**	1.020 (0.959, 1.085)
APL	Reference	Reference	Reference	Reference	Reference	Reference
Type of areas						
Rural	**−0.436 (−0.479, −0.392)¶**	**0.308 (0.266, 0.349)¶**	**2.923 (2.542, 3.360)¶**	**2.443 (2.175, 2.743)¶**	**0.824 (0.753, 0.901)¶**	**0.584 (0.537, 0.637)¶**
Urban	Reference	Reference	Reference	Reference	Reference	Reference

*P<0.001; ‡P<0.01; §P<0.01; ¶P<0.05. ANC, antenatal care; AWC, Anganwadi center; API, above the poverty line; BPL, below the poverty line; CI, confidence interval; OBC, other backward classes; PNC, postnatal care; SC/ST, scheduled castes/scheduled tribes

We concur with the findings from the previous studies stating that immunization of under-5 is determined by maternal education status, place of birth, and socioeconomic status.[27,28] Women from below the poverty line or rural areas have lower immunization rates of their under-5 compared with their counterparts, which might be due to lower education status, and lack of women empowerment and access to services. Likewise, the probability of contraceptive uptake is higher among educated women and women from urban areas compared with their counterparts.[29]

Importance for primary care physicians

Primary health centers can be a cornerstone in ensuring universal maternal health service coverage. Maternal healthcare integrated with routine services like immunization and outpatient clinics can be effectively delivered by primary physicians and frontline workers.[30] The primary physicians and midwives can go the extra mile to reach the unreached and marginalized populations by observing a special day every month (Prime Minister Safe Motherhood Campaign) and providing clinical examinations, laboratory tests, and counseling services. Our results can help primary physicians understand the gap areas that act as barriers in women's access to services and provide scientific evidence for prompt actions.

Limitations

There are a few limitations of the study, including the restriction on the number of indicators for assessing quality ANC or PNC scores, availability of data from the selected states, and cross-sectional study design. Due to a limited data set, many indicators could not be taken, such as if women received counseling during pregnancy, underwent blood or urine tests, etc., Similarly, some indicators for PNC, such as visits within 14 days of delivery, receiving counseling after pregnancy, etc.

Conclusion

We conclude that women from marginalized communities, rural areas, and with BPL status had a higher probability of visits to *Anganwadi* centers in the study areas. Women from the BPL category, rural areas, and illiterate women had lower quality ANC and PNC scores, probability of immunization of under-5, and postpartum contraceptive uptake in the study areas. This highlights the need for public health interventions that aim at educating women about child immunization, and maternal nutrition, and improving women's access to health and nutrition services, and increasing the uptake of contraceptives and antenatal care services. The national health programs need to be strengthened and monitored for better reach to the communities.

Our study brings into light the new way of defining universal health coverage with respect to maternal services. UHC is critical to ensure equitable distribution of services irrespective of caste, color, or religion. The public health system needs to achieve all dimensions of UHC through strengthening the quality of care, reaching the unreached, and monitoring the data regularly for the performance of the actions.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflicts of interest

There are no conflicts of interest.

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