

An Analysis of Delivery Care and Maternal Health Performance of Empowered Action Groups (EAG) States of India: With Special Reference to NFHS 4 & 5

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Abstract

EAGs states (Bihar, Jharkhand, Uttar Pradesh, Uttarakhand, Madhya Pradesh, Chhattisgarh, Rajasthan, and Odisha) were selected for special attention due to their lower socioeconomic and health indicators, particularly maternal and child health. This study contains 16 indicators related to delivery and maternity care. The study aims to describe the Maternal health and Delivery Care Performance of EAG states of India with the help of Composite Z- Score on the basis of NFHS 4 & 5. The maternal and delivery care status of India's Empowered Action Group (EAG) states demonstrates substantial health concerns, nevertheless there has been gradual improvement during the study period 2015-16 & 2019-20 (NFHS 4 & 5).

Keywords: EAGs States, Delivery Care, Maternal Care, Composite Z- Score & NFHS 4 & 5.

Introduction

Delivery care and maternal health refer to the healthcare services and interventions provided to women during pregnancy, childbirth, and the postpartum period to ensure the safety and well-being of both the mother and baby. These health facilities aim to reduce risks and complications associated with childbirth and improve maternal health outcomes. Delivery care encompasses all medical and non-medical support provided during labor, delivery, and the immediate postpartum period such as having a trained healthcare professional (doctor, nurse, or midwife) present during childbirth to manage normal deliveries and handle complications, delivery in a healthcare facility, labor progression, providing pain relief, and assisting with delivery while ensuring a hygienic and safe environment. Maternal health refers to the overall physical, mental, and emotional well-being of women during pregnancy, childbirth, and after delivery. It involves Antenatal Care (ANC) regular check-ups and health monitoring throughout pregnancy to ensure early detection of complications, postnatal care, nutrition and supplementation, offering contraceptive services and education to allow women to space their pregnancies, which helps reduce maternal health risks and promotes recovery between pregnancies. Screening and treating maternal mental health issues such as postpartum depression and anxiety, ensuring holistic care for women during and after childbirth. Together, delivery care and maternal health aim to provide comprehensive care that ensures a healthy pregnancy, safe delivery, and postpartum recovery, reducing maternal mortality and improving health outcomes for

mothers and their children. The primary objective of maternal health is to ensure the well-being of women during pregnancy, childbirth, and the postpartum period, with the ultimate goal of reducing maternal morbidity and mortality. This involves providing comprehensive healthcare services that promote the health of both the mother and the baby.

The Empowered Action Group (EAG) states in India comprise eight states: Bihar, Jharkhand, Madhya Pradesh, Uttar Pradesh, Uttarakhand, Chhattisgarh, Rajasthan, and Odisha. These states have been identified as socio-economically backward with underperforming health and developmental indicators. The EAG was established by the Indian government to focus on addressing these disparities, especially in terms of population control, health, education, and overall development.

Souvik Manna, Varsha Gupta, Saras Sanchaya, and Aseem Garg (2022)¹ documented disparities in maternal and child health, education, insurance, and empowerment among the indigenous people in several Indian states. In this study, secondary data from the National Data Analytics Platform database in several Indian states' tribal communities, NFHS 5, the 2011 census, and other necessary sources were analysed. According to the study, there are significant variations in the overall fertility rate among tribal people in different states, and there is a correlation between the literacy gap in each state and the proportion of ST people living below the poverty line, as well as the penetration of mobile phones among tribal women. **A. Chatterjee and VP Paily (2011)**² examined maternal health and infant mortality using NFHS 3 data from 1990 to the goal year of 2015. The study comes to the conclusion that a high maternal mortality ratio and IMR are caused by a number of factors, including inadequate health budgetary spending, poverty, low literacy, poor nutritional status, the rural-urban gap, and a shortage of skilled health sector personnel. The government programs and activities implemented to accomplish Millennium Development Goals 4 and 5 were also examined in this study.

There are a lot of studies on maternal health performance in India and rest of the world which have been done with various responsible variables to maternal and delivery care of women's performance but no study had been made for maternal performance in EAG states during the year 2015-16 and 2019-20. Therefore, it is needed to make a study on comparative study on maternal health performance of EAG states by using the composite z score index.

Objectives of the study

The objectives of the study are as follow:

- To analyse the Delivery Care and Maternal health Performance (on the basis of Composite Z- Score), the EAG states of India.
- To analyse the rank and difference of rank Composite Z score of Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states with special reference to NFHS 4 & 5.

Data source and methodology

This study is mainly an Analytical and Descriptive in nature. The study is based upon the secondary data. The study seeks to compare maternal health at the two point of time i.e., 2015-16 and 2019-20 as per availability of data. The study considers the composite index of maternal health performance of EAG states on the basis of sixteen significant indicators. For the collection of secondary data, state wise factsheet of National Family Health Survey at two points of time period, 2015-16 and 2019-20 are used. In order to find the composite index of maternal health performance, sixteen indicators have been taken. These indicators are as follows:³

S.No	Indicator Symbol	Indicators
1	X ₁	Mothers who had an antenatal check-up in the first trimester (%)
2	X ₂	Mothers who had at least 4 antenatal care visits (%)
3	X ₃	Mothers whose last birth was protected against neonatal tetanus (%)
4	X ₄	Mothers who consumed iron folic acid for 100 days or more when they were pregnant (%)
5	X ₅	Mothers who consumed iron folic acid for 180 days or more when they were pregnant (%)
6	X ₆	Registered pregnancies for which the mother received a mother and Child Protection (MCP) card (%)
7	X ₇	Mothers who received postnatal care from a doctor/nurse/LHV/ANM/midwife/other health personnel within 2 days of delivery (%)
8	X ₈	Average out-of-pocket expenditure per delivery in a public health facility (Rs.)
9	X ₉	Children born at home who were taken to a health facility for a check-up within 24 hours of birth (%)
10	X ₁₀	Institutional births (%)
11	X ₁₁	Institutional births in public facility (%)
12	X ₁₂	Home births that were conducted by skilled health personnel (%)
13	X ₁₃	Births attended by skilled health personnel (%)
14	X ₁₄	Births delivered by caesarean section (%)
15	X ₁₅	Births in a private health facility that were delivered by caesarean section (%)
16	X ₁₆	Births in a public health facility that were delivered by caesarean section (%)

In this study Z- Score Method are used to calculate composite score. It is a scientifically accepted technique for transforming data and calculating composite scores that include a lot of signs, both positive and negative. The complex Principal Component Analysis and Factor Analysis also employ this procedure to determine the composite score. There are two steps in the Z-score method of calculating the composite score, which are:⁴

1. Transformation or standardization of individual value through calculation of ‘Z’ called Standard Normal Deviate (Mean deviation per unit of variation)

$$z_i = \frac{X_i - X_i^*}{\mu_i}$$

Where, X_i is the value of a variate, X_i^{*} is mean and μ_i is Standard Deviation of the variable, and

2. Addition or summation of individual Z-values to get the composite score that is $C_j = \sum_{i=1}^n Z_i$. However, in the case of negative indicator the individual Z-value is calculated as $z_i = \frac{X_i^* - X_i}{\mu_i}$ make the values of negative indicators compatible with positive indicators while finding out the composite Z-score meaningfully.

Data analysis & Discussion

It is unthinkable to overestimate the significance of enhancing maternal health and delivery care in EAG states. Achieving national and global health goals depends on these states' success in maternal health

because they are home to some of India's most vulnerable populations. In following tables are explored the Delivery Care and Maternal health Performance of EAGs States based on NFHS 4 & 5.

Table 1: Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states (NFHS 4)

S.N o.	EAG States	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈ *	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄ *	X ₁₅ *	X ₁₆ *
1	Bihar	34.6	14.4	89.6	9.7	2.3	79.9	42.3	1784	1.8	63.8	47.6	8.2	70	6.2	31	2.6
2	Chhattisgarh	70.8	59.1	94.3	30.3	9.5	91.4	63.6	1480	4.7	70.2	55.9	8.4	78	9.9	46.6	5.7
3	Jharkhand	52	30.3	91.7	15.3	4.2	86.9	44.4	1476	2.2	61.9	41.8	8	69.6	9.9	39.5	4.6
4	Madhya Pradesh	53	35.7	89.8	23.5	9.2	92.2	54.9	1481	2.5	80.8	69.4	2.3	78	8.6	40.8	5.8
5	Orissa	64	61.9	9.3	36.5	4.2	97.2	73.2	4226	6.9	85.3	75.8	3.3	86.5	13.8	53.7	11.5
6	Rajasthan	63	38.5	89.7	17.3	6	92.3	63.7	3052	1.2	84	63.5	3.2	86.6	8.6	23.2	6.1
7	Uttar Pradesh	45.9	26.4	86.5	12.9	3.9	79.8	54	1956	0.8	67.8	44.5	4.1	70.4	9.4	31.3	4.7
8	Uttarakhand	53.5	30.9	91.4	24.9	7.2	93.4	54.8	2618	2.4	68.6	43.8	4.6	71.2	13.1	36.4	9.3
	Mean	54.60	37.15	80.29	21.30	5.81	89.14	56.36	2259.13	2.81	72.80	55.29	5.26	76.29	9.94	37.81	6.29
	SD	11.39	16.11	28.77	9.16	2.62	6.38	10.29	983.40	2.02	9.22	12.97	2.53	7.18	2.47	9.60	2.82

Data Source: NFHS 4⁵

(Note: * Negative Indicators)

Table 2: Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states (NFHS 5)

S.N o.	EAG States	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈ *	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄ *	X ₁₅ *	X ₁₆ *
1	Bihar	52.90	25.20	89.50	18.00	9.30	89.50	57.30	2848.00	2.90	76.20	56.90	6.10	79.00	9.70	39.60	3.60
2	Chhattisgarh	65.70	60.10	91.90	45.00	26.30	97.50	84.00	1833.00	9.80	85.70	70.00	5.80	88.80	15.20	57.00	8.90
3	Jharkhand	68.00	38.60	90.80	28.20	14.90	91.50	69.10	2069.00	3.40	75.80	56.80	8.40	82.50	12.80	46.70	7.00

4	Madhya Pradesh	75.40	57.50	95.00	51.40	31.80	96.70	83.50	1619.00	9.40	90.70	80.20	2.50	89.30	12.10	52.30	8.20
5	Orissa	76.90	78.10	95.20	60.80	34.40	99.40	88.40	4139.00	10.50	92.20	78.70	1.90	91.80	21.60	70.70	15.30
6	Rajasthan	76.30	55.30	93.40	33.90	14.40	98.10	85.30	2102.00	1.30	94.90	77.00	1.40	95.60	10.40	26.90	7.20
7	Uttar Pradesh	62.50	42.40	92.10	22.30	9.70	95.70	72.00	2300.00	2.40	83.40	57.70	4.70	84.80	13.70	39.40	6.20
8	Uttarakhand	68.80	61.80	93.60	46.60	25.00	97.10	78.00	3343.00	3.10	83.20	53.30	3.40	83.70	20.40	43.30	14.00
	MEAN	68.31	52.38	92.69	38.28	20.73	95.69	77.20	2531.63	5.35	85.26	66.33	4.28	86.94	14.49	46.99	8.80
	SD	8.16	16.36	1.99	15.03	9.89	3.42	10.46	854.84	3.83	7.07	11.32	2.41	5.42	4.39	13.20	3.95

Data Source: NFHS 5⁶

It mentions (Table 1 and 2) here that out of 16 indicators of Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states (X1 to X16) as given in Table 1 and Table 2, excepting X8, X14, X15 & X16, all are positive indicators of Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states. It means X8, X14, X15 & X16, i.e. average out-of-pocket expenditure per delivery in a public health facility (Rs.), Births delivered by caesarean section (%), Births in a private health facility that were delivered by caesarean section (%) & Births in a public health facility that were delivered by caesarean section (%) are negative indicators (these negative consider because according to a WHO systematic analysis, increases in caesarean section rates of up to 10-15% at the population level are linked to lower maternal, neonatal, and infant mortality (19). Above this level, increasing the number of caesarean sections is no longer associated with lower mortality).⁷ In Z Score method, the higher value of Composite Z- Score is indicative of better status of Delivery Care and Maternal health Performance while the higher value of Composite Z- Score is indicative of worst status of Delivery Care and Maternal health Performance.

Table 3: Z value of Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states (based on table 1)

S. No	EAG States	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈ *	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄ *	X ₁₅ *	X ₁₆ *	Composite Z score	Rank
1	Bihar	-1.76	-1.41	0.32	-1.27	-1.34	-1.45	-1.37	0.48	-0.50	-0.98	-0.59	1.16	-0.88	1.51	0.71	1.31	-6.03	7
2	Chhattisgarh	1.42	1.36	0.49	0.98	1.41	0.35	0.70	0.79	0.94	-0.28	0.05	1.24	0.24	0.02	-0.92	0.21	9.00	1

3	Jharkhand	-0.23	-0.43	0.40	-0.66	-0.61	-0.35	-1.16	0.80	-0.30	-1.18	-1.04	1.08	-0.93	0.02	-0.18	0.60	-4.18	6
4	Madhya Pradesh	-0.14	-0.09	0.33	0.24	1.29	0.48	-0.14	0.79	-0.15	0.87	1.09	-1.17	0.24	0.54	-0.31	0.17	4.04	3
5	Orissa	0.83	1.54	-2.47	1.66	-0.61	1.26	1.64	-2.00	2.02	1.36	1.58	-0.77	1.42	-1.56	-1.66	1.85	2.38	4
6	Rajasthan	0.74	0.08	0.33	-0.44	0.07	0.50	0.71	-0.81	-0.80	1.21	0.63	-0.81	1.44	0.54	1.52	0.07	4.99	2
7	Uttar Pradesh	-0.76	-0.67	0.22	-0.92	-0.73	-1.46	-0.23	0.31	-1.00	-0.54	-0.83	-0.46	-0.82	0.22	0.68	0.56	-6.43	8
8	Uttarakhand	-0.10	-0.39	0.39	0.39	0.53	0.67	-0.15	0.36	0.20	0.46	0.89	0.26	0.71	1.28	0.15	1.07	-3.74	5

Data Source: Compiled by author from table 1

Table 3 reveals that in the case of Bihar State, the individual Z-values of all 16 indicators, such as -1.76, -1.41, 0.32, -1.27,,1.31, are added to determine the composite Z-score value of -6.03 (Table 3). Therefore, with a composite Z-score value of 9.00, Chhattisgarh state ranks first out of the eight EAG states in India for Delivery Care and Maternal Health Performance followed by Rajasthan comes in second with 4.99, Madhya Pradesh third rank with 4.04, while Bihar & Uttar Pradesh last rank 7 & 8 with -6.03 & -6.43 respectively during the study period 2015-16 (see table 3).

Table 4: Z value of Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states (based on table 2)

S.No.	EAG States	X ₁	X ₂	X ₃	X ₄	X ₅	X ₆	X ₇	X ₈ *	X ₉	X ₁₀	X ₁₁	X ₁₂	X ₁₃	X ₁₄ *	X ₁₅ *	X ₁₆ *	Composite Z-Score	Rank
1	Bihar	-1.89	-1.66	-1.60	-1.35	-1.16	-1.81	-1.90	-0.37	-0.64	-1.28	-0.83	0.76	-1.46	1.09	0.56	1.32	-12.24	8
2	Chhattisgarh	-0.32	0.47	-0.40	0.45	0.56	0.53	0.65	0.82	1.16	0.06	0.32	0.63	0.34	-0.16	-0.76	0.03	4.34	4
3	Jharkhand	-0.04	-0.84	-0.95	-0.67	-0.59	-1.23	-0.77	0.54	-0.51	-1.34	-0.84	1.71	-0.82	0.38	0.02	0.46	-5.48	7
4	Madhya Pradesh	0.87	0.31	1.16	0.87	1.12	0.30	0.60	1.07	1.06	0.77	1.23	-0.74	0.44	0.54	-0.40	0.15	9.34	1

5	Orissa	1.05	1.57	1.26	1.50	1.38	1.08	1.07	-1.88	1.34	0.98	1.09	-0.99	0.90	-1.62	-1.80	-1.65	5.31	3
6	Rajasthan	0.98	0.18	0.36	-0.29	-0.64	0.70	0.77	0.50	-1.06	1.36	0.94	-1.20	1.60	0.93	1.52	0.41	7.07	2
7	Uttar Pradesh	-0.71	-0.61	-0.30	-1.06	-1.12	0.00	-0.50	0.27	-0.77	-0.26	-0.76	0.17	-0.39	0.18	0.58	0.66	-4.62	6
8	Uttarakhand	0.06	0.58	0.46	0.55	0.43	0.41	0.08	-0.95	-0.59	-0.29	-1.15	-0.37	-0.60	-1.35	0.28	-1.32	-3.76	5

Data Source: Compiled by author from table 2.

Table 4 reveals that with a composite Z-score value of 9.34, Madhya Pradesh state ranks first out of the eight EAG states in India for Delivery Care and Maternal Health Performance followed by Rajasthan comes in second with 7.07, Orissa third rank with 5.31, while Jharkhand & Bihar last rank 7 & 8 with -5.48 & -12.24 respectively during the study period 2019-20 (see table 4).

Table 5: Composite Z value of Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states (based on table 3 & 4)

S.No.	EAG States	NFHS 4		NFHS 5		Rank Difference
		Composite Z score	Rank	Composite Z-Score	Rank	
1	Bihar	-6.03	7	-12.24	8	-1
2	Chhattisgarh	9.00	1	4.34	4	-3
3	Jharkhand	-4.18	6	-5.48	7	-1
4	Madhya Pradesh	4.04	3	9.34	1	2
5	Orissa	2.38	4	5.31	3	1
6	Rajasthan	4.99	2	7.07	2	0
7	Uttar Pradesh	-6.43	8	-4.62	6	2
8	Uttarakhand	-3.74	5	-3.76	5	0

Data Source: Compiled by author from table 2 & 4.

Graph 1: Rank and rank difference of Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states between NFHS 4 & 5.

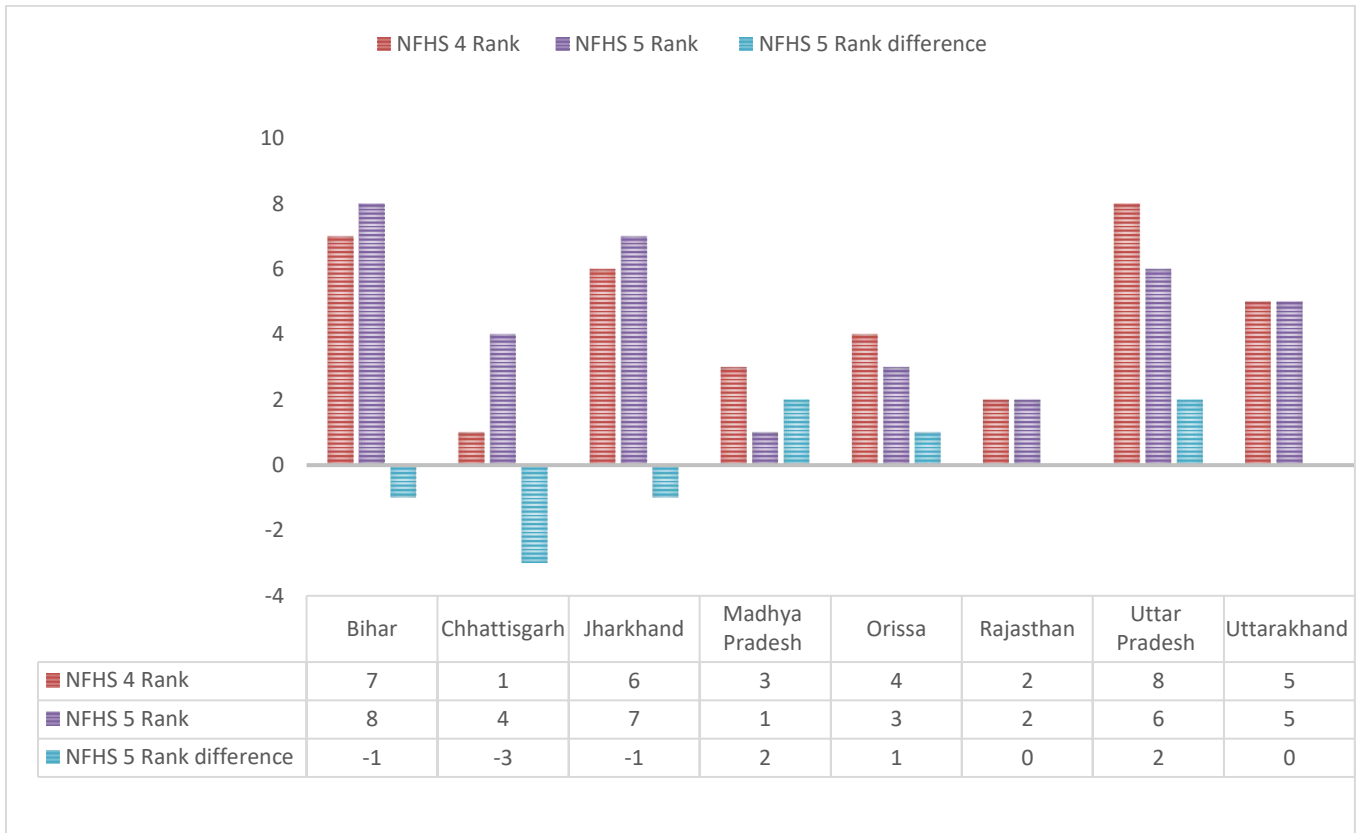


Table 5 analyse the rank and difference of rank Composite Z score of Delivery Care and Maternal health Performance of Empowered Action Groups (EAG) states with special reference to NFHS 4 & 5. Table 5 reveals that Uttar Pradesh, Madhya Pradesh & Orissa has improved their rank status of Delivery Care and Maternal health Performance from 8 to 6 position, 3 to 1 position & 4 to 3 positions respectively while Chhattisgarh, Bihar & Jharkhand has deteriorated their rank from 1 to 3 position, 7 to 8 position & 6 to 7 positions respectively during the study period. While Rajasthan & Uttarakhand has neither improved nor deteriorated their rank during the study period (See Graph 1)

Conclusions

This study concludes that Uttar Pradesh, Madhya Pradesh, Rajasthan, Uttarakhand & Orissa among EAGs states have made tremendous strides in improving maternity and delivery care indices because of Government programs like as Janani Suraksha Yojana (JSY) and Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) have helped to increase institutional deliveries and provide free maternity care. While Chhattisgarh, Bihar & Jharkhand has deteriorated but they still confront substantial obstacles. To achieve better maternal health outcomes in these locations, we must strengthen healthcare facilities, provide an appropriate workforce, improve outreach in rural areas, and address socioeconomic constraints.

Suggestions

- It is essential to make investments in healthcare facilities, especially in rural and tribal communities. This involves making certain that qualified staff, well-equipped facilities, and efficient referral channels are available.
- To enhance maternal health over the long run, programs that focus on poverty, women's education, and empowerment are crucial, especially when it comes to lowering high fertility rates and encouraging family planning.
- To maintain improvement, maternal health initiatives must be better monitored and evaluated, and district and sub-district accountability must be guaranteed.

References

1. Manna, S., Gupta, V., Sanchaya, S., & Garg, A. (2022). Inequities in maternal child health, education, and empowerment among tribal population in India. *Journal of Family Medicine and Primary Care*, 11(11), 7150-7157.
2. Chatterjee, A., & Paily, V. P. (2011). Achieving millennium development goals 4 and 5 in India. *BJOG: An International Journal of Obstetrics & Gynaecology*, 118, 47-59.
3. International Institute for Population Sciences (IIPS) and ICF, 2017. National Family Health Survey (NFHS-4), 2015-16: India. Mumbai: IIPS
4. https://epgp.inflibnet.ac.in/epgpdata/uploads/epgp_content/S000017GE/P001787/M027023/ET/1517203299CompositeScore
5. Ibid
6. International Institute for Population Sciences (IIPS) and ICF, 2021. National Family Health Survey (NFHS-5), 2019-21: India: Volume II. Mumbai: IIPS
7. WHO, H. (2015). WHO statement on caesarean section rates. *Geneva, Switzerland*.