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**Dr. Lakhbhadra Singh Naruka**  
Assistant Professor,  
Department of Geography,  
S.M.S.G. College, Sherghati  
Gaya, Bihar, India

## Regional disparity in maternal healthcare utilization among the Indian states

**Dr. Lakhbhadra Singh Naruka**

### Abstract

Woman's health plays a pivotal role in the development of any society. They are more vulnerable compared to other groups of the society not only due to their low status but also for their biological structure. Each year, more than half a million women die due to pregnancy and childbirth. Therefore, in the context of maternal health, the present study is an attempt to understand regional variation in maternal healthcare among the Indian states. The principal component analysis (PCA) method was applied to fulfil the objective of the study by using data from the National Family & Health Survey (NFHS)-III, 2005-06. The result suggests, over the time, India has tried to change its strategy and approach related to reproductive health to improve maternal and child health and it has also had some impact on their health status but not so as expected. A huge disparity is observed in maternal healthcare utilization among Indian states. In southern states, nearly more than 80 percent of women receive maternal healthcare, whereas, in central and some north-east states it found nearly 10-20 percent for various components of maternal healthcare. The maternal healthcare utilization is observed very low in Empowered Action Groups states (EAGs) and some Northeast states. The present study suggests India requires region-specific policies and programmes for maternal health to achieve its reproductive health goals.

**Keywords:** Maternal health, regional disparity, NFHS, India

### Introduction

World Health Organization (WHO) states "The healthy future of society depends on the health of children and their mothers, who are guardians of their future. However, despite much good work over the years, 10.6 million children and 529,000 mothers are still dying each year, mostly from avoidable causes" (WHO, 2005, p.1) <sup>[1]</sup>. Therefore, every nation tries to provide basic health care services to mothers and children during their pregnancy and childbirth. All over the world, more than 70 percent of child deaths occur in Africa and South-East Asia regions and 50 percent of all child deaths occurred in mainly six countries China, the Democratic Republic of the Congo, Ethiopia, India, Nigeria, and Pakistan. (WHO, 2005)<sup>1</sup>. Statistics of maternal health shows 358,000 maternal deaths occurred all over the world in 2008, in which 99 percent of maternal deaths were observed in developing countries and 65 percent of mothers died in 11 countries including Afghanistan, Bangladesh, the Democratic Republic of the Congo, Ethiopia, India, Indonesia, Kenya, Nigeria, Pakistan Sudan, and the United Republic of Tanzania (WHO 2010) <sup>[2]</sup>. These statistics reveal India has the worst situation in maternal and child health despite its high economic growth in the last decades.

Maternal and child health status is found extremely low in India compared to other countries in South Asia which is one of the worst regions after the African region. In the South-East Asia region countries like Indonesia, Maldives, Sri Lanka, and DPR Korea antenatal care (ANCs visits) and skilled birth attendance are observed more than 60 percent, whereas, in India, it is observed less than the world's average level and a slow decline observed also in child mortality. The studies suggested that the poor performance in maternal and child health is also related to the low coverage of maternal and child health care interventions, therefore, maternal and child health care interventions are needed to enhance the health of mothers and Children (WHO, 2008) <sup>[3]</sup>.

In India, reproductive age (15-49 age) women and children less than 15 years constitute around 60 percent of the total population and this group is more vulnerable than other populations regarding health due to their child-bearing and infant and child mortality.

**Corresponding Author:**  
**Dr. Lakhbhadra Singh Naruka**  
Assistant Professor,  
Department of Geography,  
S.M.S.G. College, Sherghati  
Gaya, Bihar, India

To overcome the health vulnerability among the woman and children, the government provides various maternal and child health care services during pregnancy and childbirth e.g. antenatal care, delivery care including trained birth attendance and facility to deliver their birth at health institutions and postnatal care with health check-ups, immunization, food supplement and counselling for health and treatment for diseases like diarrhoea fever and Acute Respiratory Infections (ARIs) to both children and mothers through the health programmes and policies. But in India, maternal and child health status is still not at a satisfactory level. Table 1 exhibits India's progress to achieve its Reproductive & Child Health (RCH) Targets and Millennium Development Goals (MDGs) related to maternal and child health and it shows that infant and child mortality are still very high as compared to its RCH and MDGs Targets. According to RCH-II programme goals, maternal mortality should be 100 per 100000 live births by 2010 but it is observed 212 per 100000 live births.

**Table 1:** Maternal and Child Health Goals under RCH and MGD in India

Indicator	Current Status	RCH-II/ NRHM 2010 Targets	MDGs 2015 Targets
Infant Mortality	50 *	< 30	28
Neonatal Mortality	34*	< 20	< 20
Under 5 Mortality	64 *	-	< 42
Maternal Mortality Ratio	212#	100	< 100

Source:\* RGI, 2009 <sup>[14]</sup> & # RGI 2011 <sup>[15]</sup>.

Maternal and child health is determined not only by socioeconomic, demographic and environmental factors such as income, employment, social status, education, individual behaviour, housing, and living conditions (Basu, & Basu, 1991; Navaneetham, & Dharmalingam, 2002) <sup>[4, 5]</sup> but, it also depends on supply-side factors such as availability, accessibility, and quality of healthcare system and effectiveness of healthcare services to improve the health (Caldwell, 1986; Fosu, 1994) <sup>[6, 7]</sup>. According to NFHS (2005-06) <sup>[8]</sup>, only 51 percent of mothers receive three antenatal check-ups during their pregnancy and merely 39 percent of mothers deliver their birth at a health facility and 48 percent of deliveries are assisted by trained health personnel and only 42 percent of mothers receive postpartum care within two months of their delivery. Only 43.5 percent of children are observed to be fully vaccinated against the six preventable diseases. The low utilization of maternal and child healthcare services is one of the most important reasons which contribute to high mother's and children's deaths. Therefore, a study of maternal healthcare utilization plays a crucial role to achieve the reproductive health's goal, and the present study is an attempt to see the regional variation in maternal healthcare utilization in India. This study will try to investigate how Indian states are performing in maternal healthcare utilization.

**Data and Methods**

The present study is based on the data of the National Family and Health Survey (NFHS)–III (2005-06). The NFHS is a large scale sample survey which was conducted in 2005-06 by the International Institute for Population Sciences (IIPS) with the support of the Government of India and provides information's on various issues such as mortality, fertility and family planning, reproductive health, nutrition, maternal and child health care, and high-risk sexual diseases such as HIV-AIDS, etc. along with the socio-cultural-economic and demographic characteristics of man & women who belongs to their reproductive age. In study, we analysed the data for the most recent births of women aged 15-49 for maternal health care components such as antenatal care, institutional delivery, and safe delivery and postnatal health check-ups during the five-year preceding the survey. Principal Component Analysis (PCA) has been applied to see the regional variation in maternal healthcare utilization among the Indian states. By using the PCA, a composite index of maternal health care utilization is constructed based on maternal health care components mainly antenatal visits, received of Tetanus Toxoid Injections (TTI) and Iron Folic and Acid (IFA) tablets, institutional delivery, safe delivery, and postnatal check-ups. A principal component is a linear combination of weighted observed variables and components are calculated after a sum of all weighted variables. The score for the first component is calculated through the following formula in principal component analysis-

$$C_1 = b_{11}(X_1) + b_{12}(X_2) + \dots + b_{1p}(X_p)$$

Where

**C<sub>1</sub>**:The subject's score on principal component 1 (the first component)

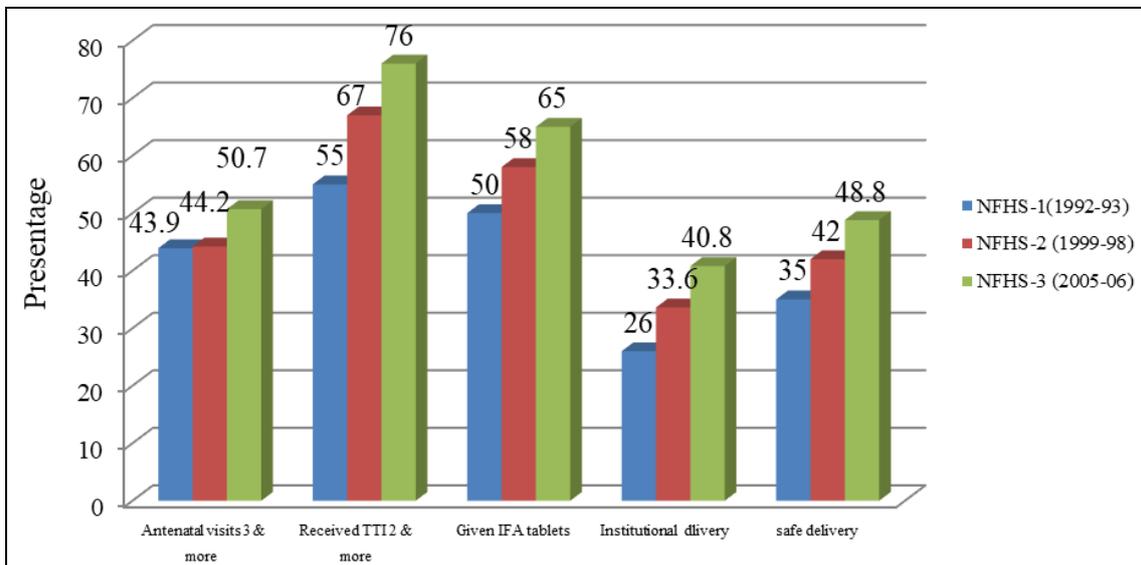
**b<sub>1p</sub>**: Weight for observed variable p, as used in creating principal component 1

**X<sub>p</sub>** : The subject's score on observed variable p.

After calculating the score, we categorized all states according to their ranks based on score and assess the maternal health care utilization for all Indian states to see the regional variation in Indian states.

**Trends in Maternal Health Care in Indi**

Figure 1 shows the trends in maternal health care utilization. All the components of maternal health care have increased over time. In antenatal visits, the growth is negligible through the NFHS-1 to NFHS-2, whereas in 2005-06 around 50 percent of women visited three and more times a health facility for antenatal care during their pregnancy period. A significant improvement has been observed in receiving Tetanus Toxoid Injection (TTI) by pregnant women over time.



Source: NFHS-1(1995-96), NFHS-2 (1998-99), and NFHS-3(2005-06).

Fig 1: Trend in Maternal Health Care Utilization in India (%)

In 1992-03 only 55 percent of women received TTI at least two times, whereas, in 1998-99 and 2005-06 it was increased to 67 percent and 76 percent respectively. Taking Iron and Folic Acid tablets during pregnancy is also important because during the pregnancy most of the mothers suffered from iron anaemia. A substantial growth observes in providing the Iron and Folic Acid (IFA) tablets to the pregnant woman. In 1992-93 only 50 percent of pregnant women received IFA tablets whereas, in 2005-06, around 65 percent of women received IFA tablets. But only giving IFA tablets to pregnant women is not important. They should take this tablet for 90 days to avoid Iron and Anaemia Deficiency. According to NFHS-3 (2005-06), only 22.3 percent of pregnant women took these IFA tablets for more than 90 days. It shows a very few proportions of pregnant women consume the IFA when requires. Similarly, in delivery care, only 26 percent of children were delivered in health institutes in 1992-93, but these numbers have reached 41 percent in 2005-06. Whereas in the case of safe delivery, in 1992-93, only 35 percent of births were assisted in delivery by health personnel, while, around 50 percent of childbirths were attended by trained health personnel during the delivery in 2005-06. It shows. in India, still nearly 50 percent of babies are delivered at homes which increases the possibility of neonatal deaths among children.

Result suggests that after 1992-93, there is substantial improvement in all the components of maternal healthcare except the antenatal visits. India changed its strategy and the approach of maternal health over time and in 1994, after the Internal Conference on Population and Development (ICPD) India adopted the reproductive child approach to improve reproductive and child health. This improvement in maternal healthcare utilization is the result of India's progress of maternal and child healthcare programmes but results are still not as satisfactory as required. India still needs to go for a mile to achieve the goals of maternal and child health.

**Regional disparity in Maternal Healthcare in India**

The utilization of various maternal health care components among the Indian states is presented in Table-2 and figure-2. Table-2 shows for antenatal visits, the highest position is occupied by Kerala with 98.98 percent which is followed by Tamil Nadu, Goa, and Andhra Pradesh with 96.15 percent, 95.45 percent, and 85.92 percent respectively. Similarly, for the other antenatal care indicators such as received Iron and Folic Acid (IFA) tablets and Tetanus Toxoid Injections (TTI), these southern states occupy the highest position. It shows that southern states are leading in antenatal care. One interesting fact also observed that TTI and

Table 2: Maternal Healthcare (MHC) Utilization among Indian States

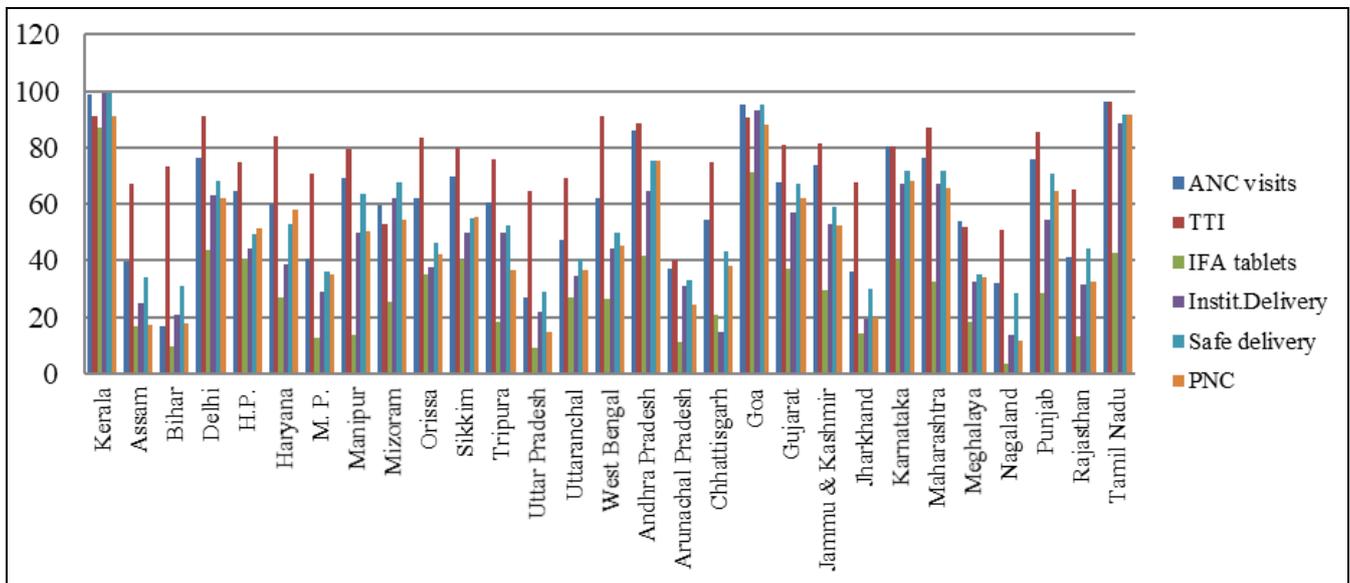
State	ANC visits 3 and more (%)	Received TTI 2 and more (%)	Received IFA Tablet 90 day and more (%)	Institutional Delivery (%)	Safe Delivery (%)	Postnatal check-up after birth* (%)	Factors Score	Rank in MHC Utilization
Kerala	98.98	91.42	86.87	99.40	99.52	90.95	2.240	1
Goa	95.45	90.48	71.43	93.18	95.45	88.10	1.965	2
Tamil Nadu	96.15	96.34	42.65	88.55	91.45	91.70	1.729	3
Andhra Pradesh	85.92	88.48	41.91	64.65	75.32	75.27	1.039	4
Karnataka	80.44	80.68	40.03	67.04	71.57	68.21	0.854	5
Maharashtra	76.52	87.20	32.82	67.29	71.71	65.70	0.768	6
Delhi	76.39	91.05	43.77	62.92	68.41	62.30	0.762	7
Punjab	75.83	85.46	28.70	54.67	70.87	64.53	0.576	8
Gujarat	67.97	80.73	37.40	56.86	67.48	62.05	0.517	9
Jammu & Kashmir	74.01	81.65	29.45	52.89	58.97	52.45	0.298	10
Sikkim	70.00	80.00	40.00	50.00	55.00	55.56	0.297	11
Mizoram	59.46	52.78	25.71	62.16	67.57	54.29	0.188	12
Manipur	69.32	79.55	13.79	50.00	63.64	50.57	0.119	13
Himachal Pradesh	64.57	74.71	40.59	44.20	49.44	51.69	0.076	14
Haryana	60.08	84.06	27.00	38.83	53.19	58.04	0.026	15
West Bengal	62.21	90.94	26.46	44.08	49.81	45.42	-0.035	16

Orissa	62.10	83.76	35.27	37.47	46.48	42.29	-0.132	17
Tripura	60.47	75.78	18.55	50.00	52.31	36.59	-0.193	18
Uttaranchal	47.16	69.05	26.99	34.46	40.88	36.52	-0.547	19
Chhattisgarh	54.35	74.94	20.98	14.80	43.35	38.00	-0.652	20
Meghalaya	54.10	52.03	18.26	32.52	34.96	34.17	-0.723	21
Rajasthan	41.17	65.31	13.26	31.75	44.26	32.48	-0.762	22
Madhya Pradesh.	40.81	70.74	12.51	28.82	36.14	35.33	-0.819	23
Assam	39.91	67.38	16.76	24.93	33.99	17.09	-1.053	24
Arunachal Pradesh	37.21	40.00	11.36	31.11	33.33	24.44	-1.122	25
Jharkhand	36.10	67.98	14.31	19.58	29.86	19.75	-1.176	26
Bihar	17.05	73.36	9.83	20.87	31.10	18.00	-1.349	27
Uttar Pradesh	26.74	64.65	8.94	21.81	28.77	14.99	-1.359	28
Nagaland	32.20	50.85	3.45	13.56	28.33	11.86	-1.532	29

Source: computed from NFHS-3 (2005-06) data. \* Postnatal check-ups are checks on the woman’s health within 42 days of the birth.

IFA tablets indicators are observed high in states which mostly have higher antenatal visits by mothers. More than 75 percent of antenatal visits are found in Maharashtra, Delhi, and Punjab. The lowest antenatal visits are observed in Bihar, followed by Uttar Pradesh with 17.1 percent and 26.7 percent. In about to the receiving TTI, more than 80 percent is observed in 14 states in which southern states are in the leading position. One interesting thing related to receiving TTI is that women have received more than 50 percent Tetanus Toxoid Injection during the pregnancy in all

states except Arunachal Pradesh where only 40 percent of women received TTI during pregnancy. There are only two states, Kerala and Goa, where more than 70 percent of women received IFA tablets and there are 11 states in which women have received less than 20 percent IFA tablets during their pregnancy, in which the lowest IFA tablets were received by women in Nagaland followed by the Uttar Pradesh and Bihar by 3.45 percent, 8.94 percent, and 9.83 percent respectively whereas other states come under moderate position in case of receiving IFA tablets.



Sources: Computed from NFHS-3 (2005-06)

Fig 2: Maternal Health Care Components by States, India (%)

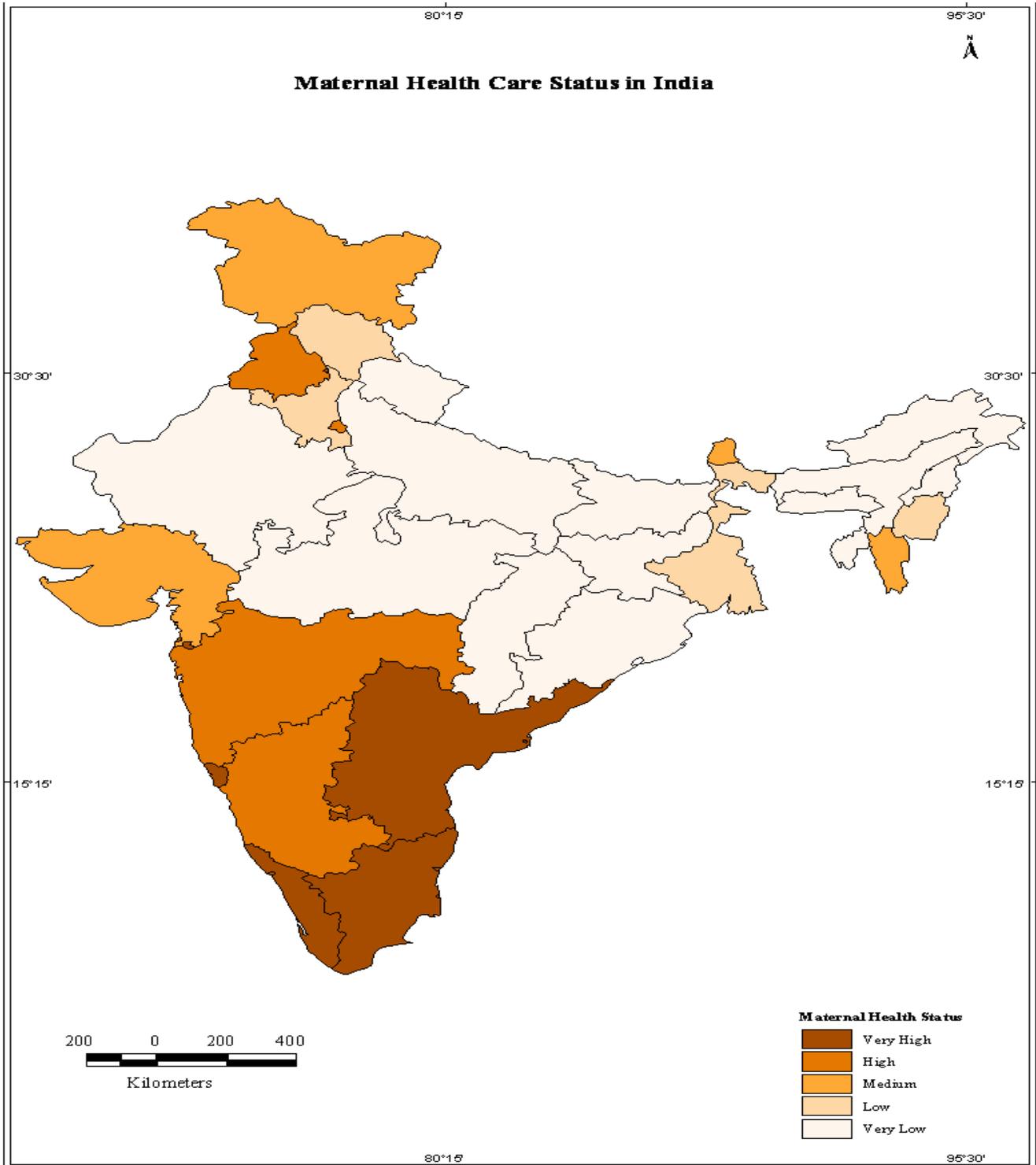
In southern Indian states e.g., Kerala, Goa, and Tamil Nadu more than 80 percent of births are delivered in health institutes, whereas, in Kerala, more than 99 percent of births are delivered in health facilities and attended by the health personnel. In all these states, including Andhra Pradesh 75 percent of deliveries are found safe. It means, in these states more than 75 percent of deliveries are assisted by trained health personnel. Whereas, in states Nagaland, Chhattisgarh, Jharkhand, Bihar, Uttar Pradesh, and Assam less than 25 percent of births are delivered in a health facility. Nagaland, Uttar Pradesh, and Jharkhand observed the lowest safe delivery as they accounted for only 28.33 percent, 28.37

percent, and 29.86 percent respectively. These are the states which mostly have high maternal mortality as compared to other states.

In the case of postnatal care (PNC), southern states Kerala, Tamil Nadu, and Goa performed well, where 80 percent of mothers obtained postnatal health check-ups. While, in Nagaland, Uttar Pradesh, Assam, Bihar, and Jharkhand only less than 20 percent of mothers receive postnatal check-ups. In Nagaland, only 12 percent of women received postnatal check-ups after their delivery. All other states stand around between 20-80 percent, where mothers obtained health check-ups after their childbirth.

**Table 3:** Maternal healthcare utilization among Indian states

Maternal Healthcare Utilization	States
Very High	Kerala, Goa, Tamil Nadu, and Andhra Pradesh
High	Karnataka, Maharashtra, Delhi, and Punjab
Medium	Gujarat, Jammu and Kashmir, Sikkim, and Mizoram
Low	Manipur, Himachal Pradesh, Haryana, and West Bengal.
Very Low	Empowered Action Group states (EAGs) and other the North East States Tripura Meghalaya, Assam, Arunachal Pradesh, and Nagaland.



**Fig 2:** Maternal healthcare utilization among in Indian states

The principal components analysis (PCA) result provides a merged picture of maternal healthcare utilization for all Indian states. Results suggest that the first rank in maternal health care utilization is obtained by Kerala which is

followed by Goa Tamil Nadu and Andhra Pradesh. Thus, these southern states have very high maternal healthcare utilization. This could be associated with their high socioeconomic development. For example, Kerala has a

very high education level and women empowerment which leads to awareness and knowledge about maternal health care among women (Caldwell, 1986; Govindasamy & Ramesh, 1997; Raghupathy, 1996) [6, 9, 10]. There are some other states such as Karnataka, Maharashtra, Delhi, and Punjab which are observed with high maternal healthcare utilization. These states also have high socioeconomic development but are not as good as compared to southern states. Whereas, Moderate maternal healthcare utilization was found among states like Gujarat, Jammu and Kashmir, Sikkim, and Mizoram.

Most of the northeast and central India states appear under very low or low utilization of maternal healthcare status. But there are wide differences in reasons behind the low maternal healthcare between the central and north-east states. The central Indian states which are also called Empowered Action Groups (EAGs) due to their poor performance in socioeconomic, demographic, and family planning and health status indicators include the Uttar Pradesh, Madhya Pradesh, Bihar, Jharkhand, Uttarakhand, Chhattisgarh, Orissa, and Rajasthan (MOHFW, 2006) [11] but their socioeconomic, demographic and physical conditions are very different from north-east states. The low maternal healthcare utilization in EAGs states is mainly related to their low socioeconomic development, whereas, in the North-East region, it could be related to unavailability and inaccessibility of the healthcare infrastructure due to its physical condition (Lalmalsawmzauva & Nayak, 2009) [12].

### Conclusion

The results of the present study suggest two specific observations. First, there are huge regional disparities in Indian states about maternal healthcare utilization such as southern states like Kerala, Tamil Nadu, Goa and Karnataka are top in the utilization of maternal healthcare, while, Empowered Action Group states (EAGs) and north-east states are observed with low or very low maternal healthcare utilization. Second, antenatal care leads to the utilization of other maternal health care components. Study result suggests that states with high antenatal care are also found with higher delivery care and postnatal care. Thus, the study has strong policy implications that there is an urgent need to provide more attention towards this wide regional gap in maternal healthcare utilization among all Indian states. Therefore, Empowered Action Group states (EAGs) and northeast states need more region-specific policies and programmes of maternal healthcare to reduce maternal and child mortality in these regions to achieve India's reproductive goals.

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