

## Inequalities and Policy Gaps in Maternal Health: Evidence from Empowered Action Group States in India

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### Abstract

**Background:** Health inequality in maternal health is one of the serious challenges currently faced by public health experts. Maternal mortality in Empowered Action Group (EAG) states is highest and so are the health inequalities prevalent. Therefore, we examine to understand maternal health inequality and the risk factors with respect to the EAG states in India.

**Methods:** A cross-sectional data from NFHS-4 (2015-16) for EAG states of India was used. Bi-variate, multivariate logistic regression, and probabilities were carried out to investigate the factors. Also, concentration indices were used to measure health inequality.

**Findings:** Our finding showed four outcomes of maternal health-antenatal care of at least 4 visits (ANC 4+), institutional delivery, contraception-use, and unmet-need. Our finding revealed the average predicted probability of women currently married using ANC 4+ in rural area is 5 percent higher than that of urban areas for EAG states. Lower contraception use, institutional delivery, and unmet need are observed among urban women. The results also indicate that better maternal health is heavily concentrated among the richer households, while negative concentration index of unmet need clearly reflects the greater demand for higher unmet need among the poor households in the EAG states.

**Conclusions:** Challenges of inequalities still persist at large in maternal health, but to achieve better health these inequalities must be reduced. Since inequality mainly affects poor households due to lower level of income. Therefore, specific measures must be taken from a demand-side perspective in order to enhance their income and reduce the disparities in the EAG states of India.

**Keywords:** Inequality; Maternal Health; EAG States; ANC; Unmet Need; Contraceptive Use; Institutional Delivery.

### Introduction

Health inequality is an emerging challenge in public health domain. It is affecting the populations at both subnational and national level [1]. Health Inequalities distress the functioning of health care system and its utilization through multiple factors, linked with the well-being of individuals [2]. Inequality in health reflects the difference in health status among individuals, groups or geographical locations within or across countries [3]. Thus, distribution of health in population is a key factor to determine the public

health performance [4]. Health inequality is particularly predominant in vulnerable groups of population which are at greater risk like women, children and elderly [5]. Health inequalities can be multiple depending on the type of health care system considered like inequalities in maternal, child, elderly or adult health. Health inequalities become important when they have result in greater morbidity and mortality outcomes.

Health inequality in maternal health is one of the serious challeng-

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es currently faced by the public health experts. It implies serious challenges, since inequality in maternal health is directly linked with child health and maternal death [6]. Maternal health inequality enhances the risk of maternal conditions, which increase the likelihood of disability and child growth [7]. Inequalities in maternal health have greater consequences on maternal and child health. These inequities not only enhance mortality and morbidity levels among women, but they also have impact on the child health as well. Further the increase the health burden through economic costs, and welfare distribution particularly in terms of yielding better health outcomes affect the overall public health system, which can be lowered while reducing the maternal health inequality in order to lower the risk of maternal death and morbidity [8,9]. Equity has now become central to health outcomes, but health inequality still persists at large due to the factors like access, awareness and affordability apart from socio-economic and geographical differentials [10]. Therefore, investing in maternal health is an important way to improve the overall health systems of country and reduce the health inequalities [11].

### **Theoretical Construct**

Inequality in health care services is gaining global attention due to poor health conditions especially among the vulnerable populations. Multiple studies have examined the determinants of health care inequalities and the burden they impose on levels of human development [12]. There are numerous factors that affect the level of inequality in maternal health, but some of the detrimental factors include antenatal care visits, institutional deliveries family planning use and demand for unmet needs. Studies have significantly highlighted the role of antenatal care in lowering the risk of maternal deaths [13].

Similarly, the role of institutional deliveries and better family planning use are also key in lowering the risk of maternal and child deaths. Inequality in maternal health not only result due to these institutional factors, but socio-economic and demographic factors play an important role in lowering the risk, such as age education, working statues and religion, apart from literacy, gender bias, socio-political environment and quality of care [14,15,16]. Inequalities in maternal health also result due to lack of access, awareness and availability to health care systems [10]. There is also an emerging evidence of the link between poverty and maternal deaths in low- and middle-income countries [17]. Cross country studies in developing countries have shown that deaths due to maternal health consequences have consistently increased due to rise in poverty. Furthermore, gender inequality and women's low social status and disempowerment significantly impact maternal health and demand for maternal healthcare services [18].

### **Maternal Health in Indian Settings**

India is one of the countries with greater inequalities in health care [19]. Although India's maternal and child mortality rate has declined over the last two decades (SRS Reports), but health differentials are still very high at regional level. India is not too far in the

list of countries with the slowest improvement in terms of maternal health. Despite implementing numerous programs and policies, maternal health inequality is still higher in India. While only little achievement could be made from MDG perspective which were less conclusive. Earlier studies have shown that large inequalities exist due to socio-economic and demographic factors [20]. But there are other factors like literacy, awareness and regional differences attributed to this rising health inequality in India. According to study conducted by economic status is one of major factors, which result in higher level of inequality in India [21]. Whereas another reason is the multiple deprivation, which increases the risk of health care utilization [22]. Similarly factors like poverty and lack of accesses result in persistent health inequalities [23,24]. Inequalities also persist highly due to regional and rural-urban differentials [20,25].

India is now aiming for achieving the target of Sustainable Development Goals, through National Health Policy (NHP), that aims to bring down maternal mortality ratio to 100 by the year 2020 but to achieve these targets it is necessary to understand the level of inequality that affecting the maternal level outcomes and our study is one of such attempts [26]. Maternal mortality in Empowered Action Group (EAG) states is highest and so is the health inequalities prevalent in these states [27]. Accounting 48% of India's total population EAG states are at a greater risk due to the level of health disparities [28]. Although numerous attempts have been carried out earlier to reduce the disparities across health sectors. But despite these attempts and policy interventions, maternal and reproductive health is unacceptably emerging as a challenge in India. Thus, the present study will make a comprehensive attempt to understand the maternal health inequality and the risk factors with respect to the EAG states in India.

### **Methods**

#### **Data**

Data for the study was used from the fourth round of DHS India also called as National Family Household survey (NFHS). This survey was employed based on 2011 census of India. The survey included all regions of India, but our focus was especially on the EAG states only. National Family Health Survey is a large-scale, multi-round survey conducted in a representative sample of households throughout India. NFHS-4 is based on sample of 699,686 women in 601,509 households with a response rate of 98%. The survey included 425,563 households from rural areas and 175,946 households from urban areas. The sample size for NFHS-4 is based on two-stage sample design. NFHS-4 data provides up to district level information on socio-demographic and health indicators like fertility, family planning, infant and child morbidity and mortality, maternal and reproductive health, nutritional status of women and children, and the quality of the health services. Our study mainly focuses on EAG states with an estimated sample size of 353480.

#### **Methodology**

Bivariate analysis including prevalence and proportions were used

to examine the distribution of socio-demographic, economic and maternal health outcomes. The factors associated with dependent variables were examined using first the logistic regression and then probabilities were computed to understand the dynamics. There are number of methods used to examine the health disparities among households and their health care utilization like equity gaps, equity ratios, concentration curve and concentration indices [29]. We used concentration indices to measure the health inequality. Income-related maternal health inequality was assessed by plotting the cumulative proportion of health across individuals ranked from poorest to richest. All analyses were conducted using STATA 14.0.

## Results

Table 1 shows the sample distribution of maternal health indicators by Empowered Action Groups (EAG) states of India for the

currently married women. There are 353480 samples of currently married women in the EAG states of India. The highest receiving percentage of ANC 4+ was found in Odisha (63%) followed by Chhattisgarh (59.55 %) and Rajasthan (38.89 %), but the lowest receiving percentage of ANC 4+ was found in Uttar Pradesh (26.52%) followed by Uttarakhand (4.89 %). Use of contraceptives by women in Rajasthan (57.7%) is highest in comparison to the other EAG states and lowest in Bihar (24.1%). The highest institutional birth is found in Odisha (69.47%) whereas lowest is found in Jharkhand (42%). The unmet need of family planning is found to be lowest in Madhya Pradesh (12.14%) and highest in Bihar (21.15%). Accessing health care problems are highly faced by women in Odisha (86.79%) followed by Bihar (83.66%), Chhattisgarh (82.29%) and Jharkhand (82.27%).

**Table 1: Percentage of currently married women using maternal health indicators for Empowered-Action-Group (EAG) states of India from National Family Health Survey (Round-IV).**

EAG States	ANC 4+	C-Use	Institutional Delivery	Unmet Need	Sample Size
Bihar	14.81	24.1	48.61	21.15	45,812
Chhattisgarh	59.55	57.7	57.25	11.11	25,172
Jharkhand	30.44	40.4	42.54	18.37	29,046
Madhya Pradesh	37.53	51.4	69.47	12.14	62,803
Odisha	63.19	57.3	76.08	13.61	33,721
Rajasthan	38.89	59.7	63.8	12.31	41,965
Uttar Pradesh	26.52	45.5	44.91	18.05	97,661
Uttarakhand	32.05	53.4	45.49	15.54	17,300
Total	31.3	45.3	53.82	16.34	3,53,480

Authors' own calculation using NFHS-IV

Our study measured the four outcome variables of maternal health namely antenatal care of at least 4 visits, Institutional delivery, Contraceptive Use and Unmet need. The basic socio-demographic

characteristics with percentages of the respondents in EAG states were presented in Table 2

**Table 2: Percentage of women currently married by background characteristics using maternal health indicators for Empowered-Action-Group (EAG) of India from National Family Health Survey (Round-IV).**

Background Characteristics	ANC 4+	C-Use	Institutional Delivery	Unmet Need
Age Groups				
Below 20	29.51	8.6	80.64	25.58
20-30	33.25	31.7	76.47	24.09
30-40	28.56	57.6	68.61	14.02
40+	16.17	55.5	50.82	6.22
Place of Residence				
Urban	48.39	53.74	82.84	13.95
Rural	27.1	42.85	71.36	17.03
Education				
No Education	18.28	45.61	60.75	14.29
Primary	29.36	47.95	72.54	15.7
Secondary	40.01	43.83	83.63	18.62
Higher	58.92	44.77	93.79	19.97

Religion				
Hindu	31.91	47.11	75.44	15.65
Muslim	27.11	32.3	63.77	21.38
Other	37.02	44.31	66.77	16.04
Caste				
ST	25.56	44.16	70.72	16.8
SC	34.52	44.44	64.77	14.64
OBC	29.62	44.85	74.23	16.51
OTHER	41.41	48.86	81.35	16.37
Wealth Index				
Poorest	17.42	36.11	60.56	18.93
Poor	27.85	44.25	74.46	16.39
Middle	36.31	48.79	80.42	15.23
Richer	45.49	51.64	85.03	15.01
Richest	62.28	57.37	92.77	13.04
Work Status				
Non-Working	33.28	44.47	75.57	17.28
Working	28.41	56.61	66.04	12.23
Total	24.73	53.03	73.7	16.24

Authors' own calculation using NFHS-IV

The results in Table 3 shows the predicted probabilities for the outcome variables based on the wealth and residence. The resulted show that average predicted probability of women currently married using ANC 4+ in rural area is 5 percent higher than that of

urban areas for Empowered-Action-Group (EAG) states of India. While as it was found to be lower among the urban women in case of contraception use institutional delivery and Unmet need as shown in the Table 3.

**Table 3: Probability of currently married women Residence and Wealth Index using maternal health indicators for Empowered-Action-Group (EAG)of India from National Family Health Survey (Round-IV).**

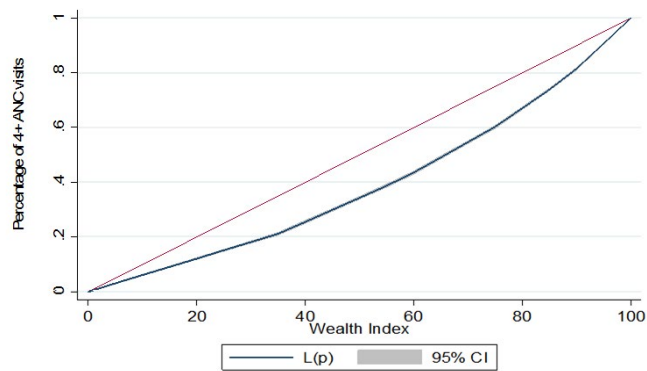
Background Characteristics	ANC 4+	C-Use	Institutional Delivery	Unmet Need
Margins with [Confidence Interval (%)]				
Place of Residence				
Rural	0.33 [0.33,0.33]	0.36 [0.36,0.36]	0.75 [0.75,0.75]	0.11 [0.11,0.11]
Urban	0.37 [0.37,0.38]	0.34 [0.34,0.35]	0.73 [0.73,0.74]	0.10 [0.10,0.10]
Wealth Index				
Poorest	0.21 [0.21,0.22]	0.30 [0.30,0.30]	0.61 [0.61,0.62]	0.13 [0.12,0.13]
Poorer	0.31 [0.30,0.31]	0.35 [0.35,0.35]	0.75 [0.75,0.76]	0.11 [0.11,0.11]
Middle	0.38 [0.37,0.39]	0.37 [0.37,0.38]	0.81 [0.80,0.81]	0.10 [0.10,0.10]
Richer	0.46 [0.45,0.47]	0.39 [0.38,0.39]	0.86 [0.85,0.86]	0.10 [0.10,0.11]
Richest	0.61 [0.60,0.62]	0.42 [0.41,0.42]	0.93 [0.93,0.94]	0.09 [0.09,0.10]

Authors' own calculation using NFHS-IV

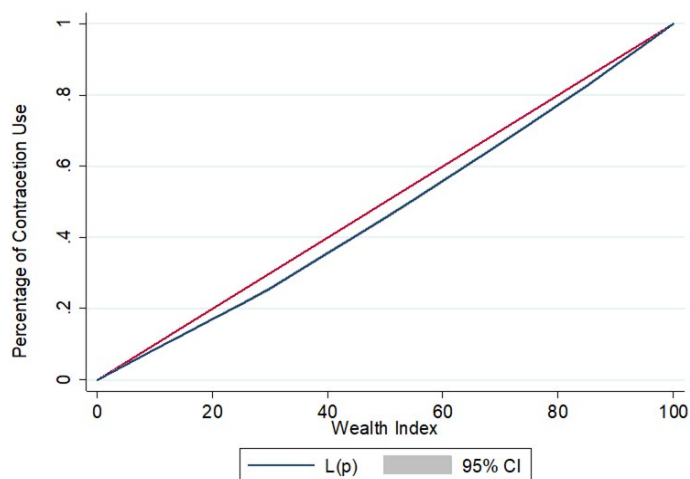
Similarly, while calculating the predicted probability based on logistic regression, we found that poorest has the lowest probability of using any maternal health indicator except unmet need which is highest them. It can be found from the Table 3 that the probability of using contraception is 30 percent only to that poorer which around 35 percent. The clearly should the higher percentage of probabilities in terms of demand for unmet needs. Table 4 presents the results computed from concentration indices computed for the outcome variables against the wealth income. The results clearly

indicate that better maternal health is heavily concentrated among the richer households, while as the negative concentration index of unmet need clearly reflects the greater demand for higher unmet need among the poor households in the EAG states.

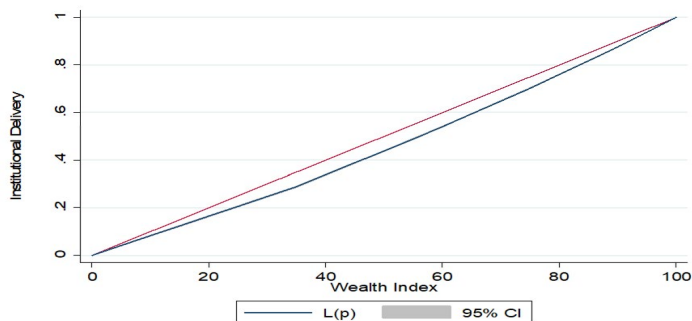
Figure 1 to Figure 4 shows the concentration curves of outcome variables by wealth Index. These curves clearly show the greater levels of inequality in the maternal health among the poorest households in the EAG states.



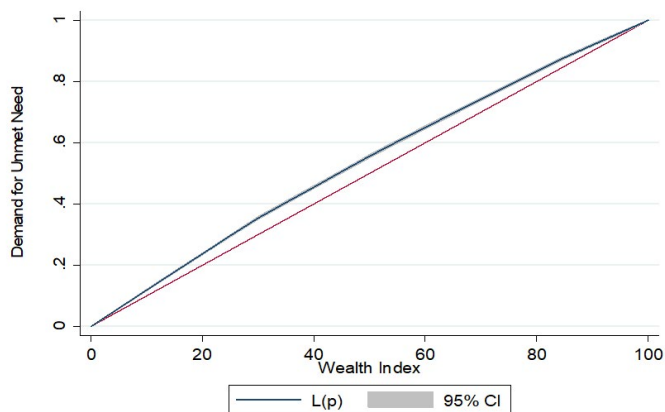
**Figure 1:** Concentration curve of ANC 4+ by wealth index of EAG states' households of India from National Family Health Survey (Round-IV).B2



**Figure 2:** Concentration curve of contraceptive use by wealth index of EAG states' households of India from National Family Health Survey (Round-IV).



**Figure 3:** Concentration curve of institutional delivery by wealth index of EAG states' households of India from National Family Health Survey (Round-IV).



**Figure 4:** Concentration curve of unmet need by wealth index of EAG states' households of India from National Family Health Survey (Round-IV).

**Table 4: Concentration indices of currently married women using maternal health indicators for Empowered-Action-Group (EAG) of India from National Family Health Survey (Round-IV).**

Maternal health indicators	Index values	Robust Std. Error
ANC 4+	0.25	0.004
C-Use	0.07	0.002
Institutional Birth	0.08	0.002
Unmet Need	-0.09	0.004

Authors' own calculation using NFHS-IV

## Discussion

Health plays a significant role in driving the economy. A good and equitable health system lessens the economic burden and minimizes the risk of mortality and morbidity outcomes [30]. Studies measuring health disparities have grown on a scale over the time to underlie the factors that help in measuring the disparities and determine the factors which help us to measure the health inequalities [31-33]. Similarly, various studies have tried to examine the

inequality in maternal health care due to various factors of being socio-economic and demographic in nature. It is clear from our results that within region inequality is highly persistent in India as shown by the varying maternal health indicators across the regions (NFHS-4). Our findings clearly suggest that the largest gap results in coverage between the richest and poorest, due to their socio-economic differentials. These inequalities can be clearly seen in case of ANC Visits, institutional delivery and contraception use

well supported by previous other studies as well [34,35]. Thus, the inequality gap has not reduced over time. Inequality in maternal health care is a critical issue and must be addressed. There are several factors contributing to its persistent prevalence among the poor households as found in our study. Our study was consistent with the earlier studies that reflected the economic marginalization is a key factor to reflect the greater level of inequality in maternal health among poor household [21].

The results in the study showed that there is a substantial inequality present among all the outcome variables between poor and rich households in the selected states. Poor households are at more risk, since 50 percent among richest group are benefiting from the services than the poorest households. Which reflects the vulnerability among poor people to benefit from the maternal health care services. Previous studies in this context have almost reflected the similar outcomes like who found that inequality in health facility delivery is lowest among the poor [36]. While as the other reason reflected to this persistent inequality is the higher cost, which keeps women from poor household at bay to reap out the benefits from the maternal health care [37,38]. Similarly, inequality in ANC services among poor is due to poor coverage and access at which involves costs that are less affordable to poor households [39]. Although the study could not emphasize on the access and affordability, but the determinant factors that result in affordability is mainly the lack of access. Unmet need is one of the keys. Thus it depends upon the kind of services provide and the lack of communication between the households especially poor. Our findings are in line with what has been emphasized by the earlier studies in reasons for access and affordability as a key concern in terms of rising inequalities of health care outcomes. The policies and programs must aim from strengthening the utilization services while improve accessibility and awareness especially among the poor women households. Both the supply and demand side factors must be targeted coincide in order to attain the equity in maternal health coverage. Poor households are likely at a greater risk from profiting the health care services provided. While there is an urgent need to reduce the inequalities in maternal health. Adequate access to factors like antenatal care, institutional delivery, family planning use and other numerous maternal health indicators must be provided at large. Since full ANC is essential in lowering the risk of maternal health, it should be prioritized among the poor [40]. Similarly, Institutional based delivery helps to reduce the maternal mortality and morbidity, which must to be taken care of in order to reduce inequality and provide the equal distribution of health. While as issues of unmet needs must be addressed in order to avert the challenges of family planning [13]. Furthermore, access can also be pivotal in lowering the risk of inequality, but that must be provided with the domain especially of poor households. Because health care utilization can be optimal provided better access [29].

## Conclusions

Thus, to sum up, although the challenges of inequalities persist at large in maternal health, but to achieve better health, these inequal-

ities must be reduced. At the same time, it is clear from the above that inequality mainly affects the poor households due to lower levels of income. Inadequate utilization of healthcare services has been observed in the EAG states, especially among low-income families, which revealed that there is a need to improve the quality of public healthcare services. Due to lack of knowledge, religious objections and access to healthcare services in Bihar, the use of contraception is lowest, thus, there is a need to encourage and widespread the knowledge about the use of contraception. Also, it is essential to strengthening the health infrastructure in Jharkhand to increase the institutional delivery and this can play a crucial role in reducing maternal health consequences. The State Government of EAG states should establish an equitable approach to healthcare services for everyone. Therefore, specific policy must be taken from a demand-side perspective to enhance their income and reduce the health disparities in the EAG states of India.

## Abbreviations

**EAG:** Empowered Action Group  
**NFHS:** National Family Health Survey  
**ANC:** Ante Natal Care  
**SRS:** Sample Registration Systems  
**MDG:** Millennium Development Goal  
**NHP:** National Health Policy  
**DHS:** Demographic Health Survey  
**C-use:** Contraceptive use

## Ethics Declarations

### Ethics Approval and Consent to Participate

The present study has used secondary data information from the fourth round of National Family Health Survey, 2015-16 for India which is publicly available and with no access to personal identifiers. Therefore, no ethical approval is required for conducting this study.

## Availability of Data and Materials

The dataset analyzed during the current study are available in the Demographic Health Surveys (DHS) repository, <https://dhsprogram.com/data/available-datasets.cfm>.

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## Contributions

MAM and SNA conceived of the study, performed data analysis, interpreted the results, and wrote the manuscript. EN has review & wrote the manuscript.

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