

Comparative Analysis of Quality of Health Determining the Infant Mortality Rate in the Empowered Action Group (EAG) States of India, Insights from the National Family Health Survey- 3 and 4

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Abstract : *The Empowered action Group (EAG) states were formed by the Ministry of Health and Family Welfare (MoHFW) to facilitate the creation of area specific programs, with special emphasis on eight states that have been lagging far behind in containing population growth to manageable limits. These include eight states namely Bihar, Chhattisgarh, Jharkhand, Orissa, Madhya Pradesh, Rajasthan, Assam, Uttarakhand, and Uttar Pradesh, lagging far behind in the demographic transition and have the highest infant mortality rates in the country. In terms of the performances of factors affecting Infant Mortality Rate, Orissa and Chhattisgarh can be stated as 'prospect region' whereas states like Jharkhand and Bihar can be labeled as 'problem region'. In line with this concept, a detailed analysis has been done about the health parameters that affect the IMR in these states both on a spatial scale and a temporal scale, thereby pointing towards the planning framework that should be initiated to look into the same.*

Keywords : *Infant mortality, Rural-urban dichotomy, Quality of health*

Introduction

The infant mortality rate (IMR), defined as the number of deaths in children under one year of age per 1000 live births in a particular year is highly sensitive measure of population health as it indicates levels of economic development, housing conditions, social well-being, and the quality of the surrounding environment. Multiple factors are responsible for infant mortality. Okeke and Chari (2018) are of the opinion high rates of home births in developing countries is often linked to high rates of newborn deaths by analyzing the timing of birth, health care utilization, and mortality for a sample of births between 2009-2014 in 7021 rural Nigerian households. They show that timing of birth is strongly linked to use of institutional care that is women with a nighttime birth are significantly less likely to use a health facility because of the difficulties associated with accessing care at night. In contrast, when households have a nearby health facility that provides care at night, there is no such increase in mortality. In a research analysis carried out by Dubey and Nath (2016), it has been

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found out that low birth weight (LBW) is the dominating risk factor for infant morbidity and mortality. They have used third round of the National Family Health Survey (NFHS-3) data collected during 2005-2006 with a conclusion being reached that the prevalence of low birth weight was observed high among those women who were underweight, anemic, never visited for any antenatal checkup. Pradeep Kumar Choudhury (2013) has tried to establish a relationship between parental education and infant mortality in India by using data from the National Family Health Survey 2005-06. This study focuses on the role of parent's education and other related factors which contribute in reducing infant mortality differ significantly with the region, focusing on the Empowered Action Group (EAG) and Non EAG states. The regression results show that the education of parents significantly determines the infant mortality across India. Although in many research analysis the scholars have made an effort to find out the reasons behind the high IMR in EAG states but few have tried to find out the quality of health and map it out on the basis of the composite scores which gives a glimpse of the scenario of the Infant Mortality Rate which are affected by some factors as has been pointed out in this paper.

Objectives

- To analyze the causes for the differential rate of IMR across the empowered action group states of India.
- To delve into the comparative analysis of the quality of the health factors impacting IMR for the time frame 2005-06 and 2015-16 and by looking into urban-rural dichotomy based on NFHS 2015-16.

Database and Methodology

The data has been compiled from the reports of eight EAG states of India from National Family Health Survey (NFHS) 3 for the year 2005-06 and NFHS 4 for the year 2015-16. Regarding the data analysis the whole study has been done at three levels. The health of the child is greatly influenced by factors related to the mother, her education, her situation prior to and post the pregnancy, the care received before, during and after the pregnancy, location of birth, and the care received by the child during the first few years of his or her life. Another factor is the household's socio-economic status which influences mother's ability to provide better health care, food with adequate nutrients, clothing, clean tap water, and clean sanitary conditions for their children (Barrett and Browne, 1996; Defo, 1997; Aber et al., 1997). Firstly, the levels of infant mortality rate is presented by delving into the factors that affect it with literacy rate, nutritional status of mothers, access to medical facilities, access to full immunization, sanitation and water supply condition primarily in the EAG states and this has been done with the help of composite score and standard deviation technique. In each of these regions the pattern of infant mortality rate is discussed by not only comparing the states but also focusing on its place of residence (rural urban). Secondly the decadal growth rate of infant mortality rate from 2005-2006 to 2015-2016 has been calculated and choropleth mapping has been used to depict the scenario. Thirdly in order to access the condition of infant mortality entirely quantitative research methodology has been employed for the analysis part.

Composite Score and Standard Deviation technique has been used (Bracy, 1952, Singh and Singh, 1979) for determining the scenario of infant mortality with the above mentioned ten chosen parameters. A weight has been assigned accordingly, with 1 denoting the worst condition and the value increasing with relatively better conditions. The product of the weight and proportion of population obtained for each of the indicators for a particular state both rural and urban which has been summed up altogether to arrive at the Composite Score. For the rural and urban areas, the mean and standard deviation has been calculated followed by grouping of states based on the composite scores so obtained. A higher value of the index suggests relatively better picture of the health scenario while lower values of the score indicate deplorable condition persisting in the states. Multiple regression analysis have been carried to so how much is explanatory variables explaining the infant mortality rate which is our explained variable and the following ten factors (Table 1) have been found to be significantly affecting Infant Mortality Rate.

Table 1. List of the Independent/Explanatory Variables Affecting Infant Mortality Rate

Variable No	Name of the variables
X1	Literacy level among parents
X2	Mothers Body Mass Index Below Normal
X3	Institutional Deliveries
X4	Improved Sanitation Facility
X5	Improved Drinking Water Facility
X6	Full antenatal check up
X7	Children born at home taken to health facility within 24 hours
X8	Mothers who received post natal care from doctors
X9	Children aged 12-23 months fully immunized
X10	Children under age 6 months exclusively breastfed

Background of the Study

Infant survival depend on a wide array of factors be it socioeconomic, environmental or general standards of living. Determining the contribution of each of these factors provides useful feedback to the programs related to maternal and infant health. The distribution of infant mortality and the factors causing it vary across space and time. Hence capturing such variations with the help of map and statistical analysis shall give a comprehensive view and help the planners to take adequate step to provide help to those areas which are in dire need of it. It is in this context that the present study has been conducted to get a detailed analysis about the health parameters that affect the IMR in Empowered Action Group (EAG) states both on a spatial scale and a temporal scale, thereby pointing towards the planning framework that should be initiated to look into the same.

LOCATION OF THE STUDY AREA

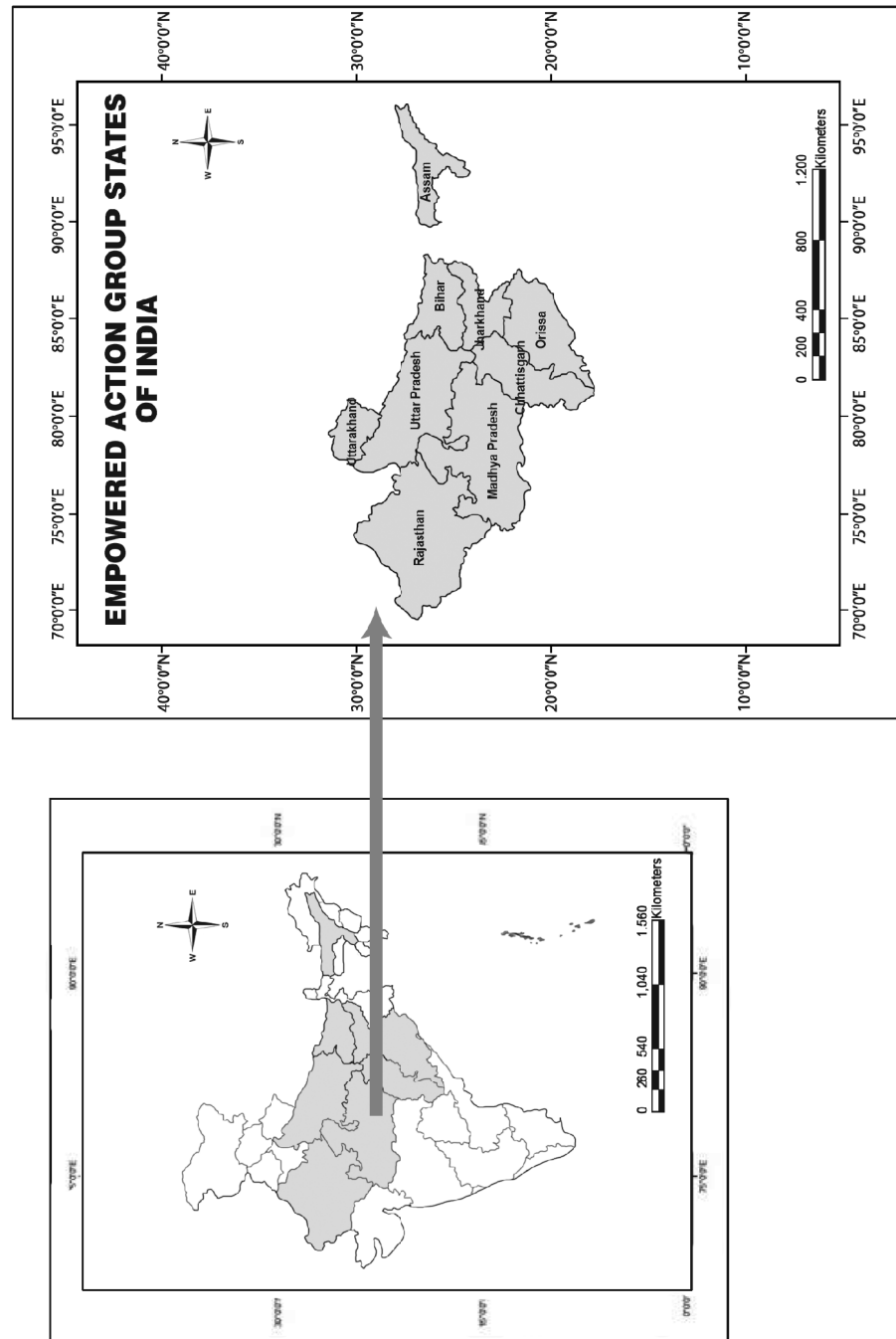


Fig 1. Location Map of the Study Area

The Study Area

The Empowered action Group (EAG) states (Fig. 1) were formed by the Ministry of Health and Family Welfare (MoHFW) to facilitate the creation of area specific programs, with special emphasis on eight states that have been lagging far behind in containing population growth to manageable limits. These include eight states namely Bihar, Chhattisgarh, Jharkhand, Orissa, Madhya Pradesh, Rajasthan, Assam, Uttarakhand, and Uttar Pradesh.

Decadal Growth Rate of Infant Mortality Rate from 2005-06 to 2015-16

According to the comparative analysis of the IMR based on the maps (Fig. 2) what can be inferred is that positive scenario prevails more in Orissa, Chattisgarh and Rajasthan in terms of IMR which has drastically reduced followed by Assam, Bihar and Madhya Pradesh. The decadal growth rate of IMR is moderate in states like Bihar, Assam and Chattisgarh which can be attributed to factors like increase in public expenditure that covers the medical facilities. Chhattisgarh has witnessed negative growth rate in the infant mortality rate which can be attributed to the effective implementation of health services and Aanganbadi services in state followed by vaccination programmes carried out across the State like 'Mother-Infant Health Programme', 'Janani-Suraksha Yojana'. (Dawn and Basu, 2016)

The scenario is grim over states like Uttarakhand and Uttar Pradesh. The state that has witnessed little or no such change in IMR is Uttarakhand. Among the districts with high IMR in Uttarakhand were Dehradun, Nainital and Haridwar. Due to increase in migrants and home deliveries infant mortality remains more or less unaffected. A number of migrants come to these districts from the surrounding hilly region in search of livelihood which results into women ending up living in slums and thereby suffer from anaemia, malnutrition and less access to antenatal care due to dearth of jobs (Rawat and Belwal, 2016). In case of Uttar Pradesh the decadal growth rate is least appreciating and the reason behind it is that most of the infants are not fully immunized followed by degrading maternal health care conditions.

The condition of decadal growth rate of IMR is not appreciable in Madhya Pradesh as its health sector is suffering from many issues ranging from shortage of doctors to lack of proper primary health care infrastructure in rural areas (Kulkarni, 2016). In case of Rajasthan, a state which has controlled the rate of IMR has embarked on immunization against fatal diseases has helped the health authorities in bringing down IMR. About 83% of children are fully vaccinated. In case of Orissa, the IMR is considerably low since the state has witnessed a sharp increase in institutional deliveries planning and ante-natal care of mothers (Som and Mishra, 2016). What can be seen from the decadal growth rate analysis of IMR is that although in case of Bihar the overall IMR has decreased up to 48% in 2015-2016 from 62% in 2005-2006, but in terms of joint performance of the ten factors discussed above Bihar stills lags behind and is worst affected in both the rural and urban areas followed by Jharkhand.

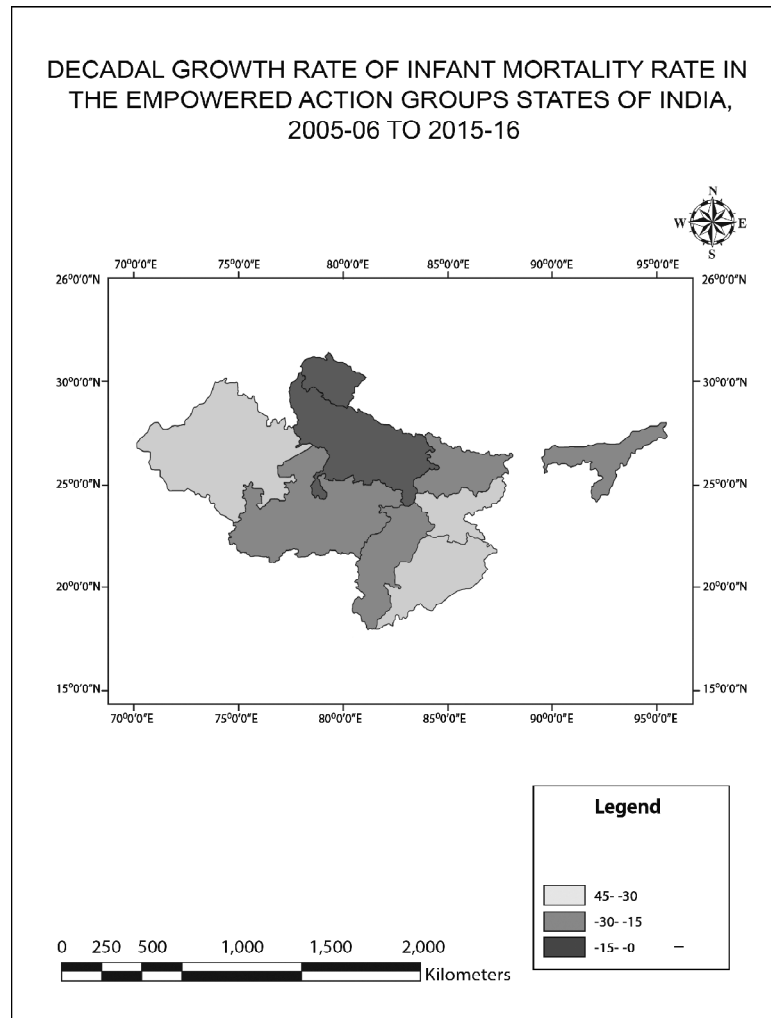


Fig. 2. Decadal growth rate of Infant Mortality Rate in the EAG states, 2005-06 to 2015-16

Poor maternal health, big population, large family sizes, overcrowding, all leading to increased infections. Many people, especially in rural population of Bihar do not get their child vaccinated. In case of Assam the IMR has lowered down because of the strategies implemented to reduce IMR in the state include Facility Based New Born Care, New Born Care Corner, New Born Stabilisation Unit, Nutritional Rehabilitation Centre, Nutritional Counselling and Management Centre, Pediatric Intensive Care Units and Home Based Newborn Care. Chhattisgarh has reported a significant decline in the Infant Mortality Rate from 71 per 1000 in year 2005-2006 to 54 in year 2015-2016. The decadal growth rate of IMR is highly negative in states like Rajasthan, Jharkhand, Orissa and

Chattisgarh but if one delves deep into the factors that affect affect IMR, it is not appreciable in the state of Jharkhand since most of the tribal people suffer from poverty thereby get less access to medical facilities.

Quality of Health Factors Affecting the Infant Mortality Rate in EAG States, 2005-06 and 2015-16

It is observed that the parents with lower level of education are having higher infant mortality rate. It is expected that the parents with higher level of education prefer institutional delivery, do not follow taboos and superstitions in caring their baby, which helps in reducing the IMR. More clearly, parents with higher level of education are generally better informed about the antenatal and postnatal care than the parents with less level of education (Chowdhury, 2013). In the urban areas parents' literacy plays a positive role in bringing the IMR in states like Orissa, Rajasthan, Chattisgarh as opposed to that in the rural areas because of inadequate educational infrastructure rural areas.

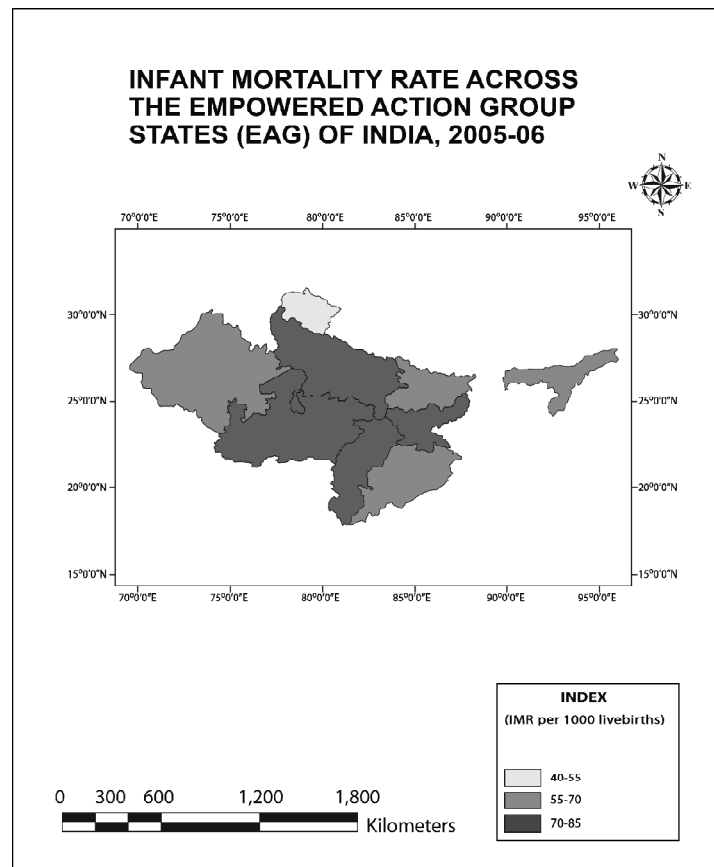


Fig 3. Distribution of IMR in EAG states, 2005-06.

The health parameter of nutritional status of mothers is indicated by taking into account mother body mass index below normal which is less than 18.5 kg/m^2 . Women of EAG states especially in the rural areas of Jharkhand, Bihar Chhattisgarh and Uttar Pradesh, face higher degree of nutritional disorder that which increases the infant mortality. A low body mass index usually reflects energy deficiency. Poor incomes mainly in rural areas of Bihar lead to people not having access to healthy food (Kulasekaran, 2012). The proportion of mothers who had full antenatal care is very less in states like Bihar, Jharkhand and Uttar Pradesh where people mainly prefer home deliveries. Since most of the people are illiterate so people are not really aware of the full antenatal checkup that comprise at least four antenatal visits, at least one tetanus toxoid injection and iron folic acid tablets or syrup taken for 100 or more days.

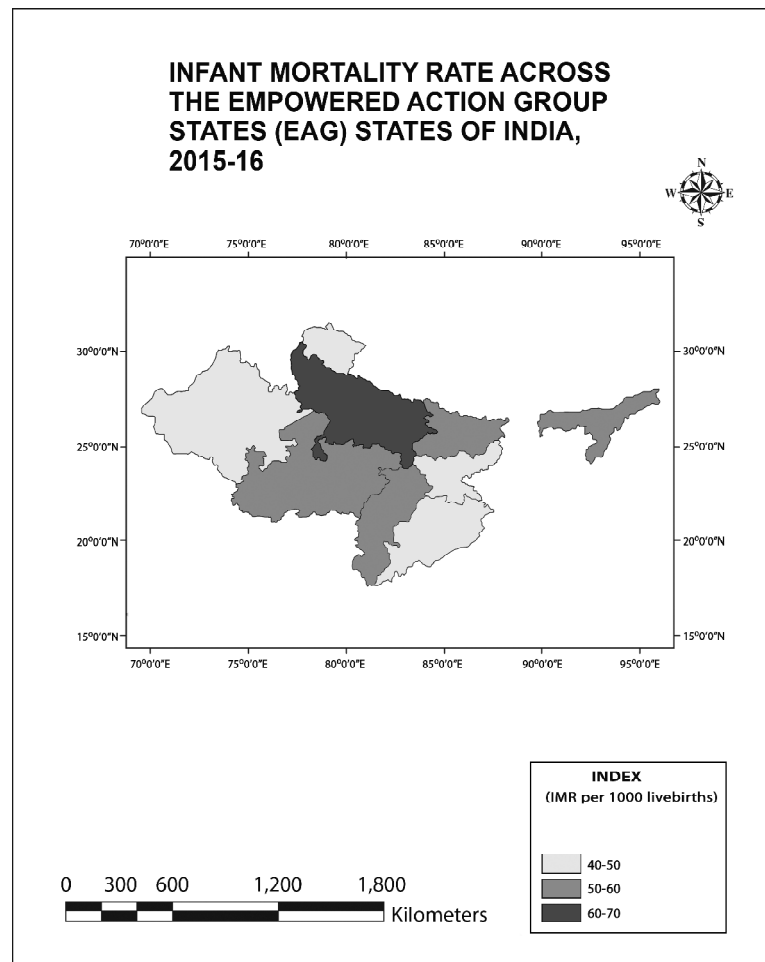


Fig 4. Distribution of IMR in EAG states, 2015-16.

Both Bihar and Madhya Pradesh has shown increase of antenatal check-up percentage from NFHS-3 to NFHS-4 but Madhya Pradesh has managed to increase the percentage change by more than 10% from NFHS 3 to NFHS 4 in comparison to dismal performance of Bihar which is around 2% only. The proportion of mothers receiving the post natal care is very less in states of Bihar, Madhya Pradesh, Uttarakhand and Uttar Pradesh as opposed to that of Orissa and Chattisgarh which has contributed to higher composite score values in the states of Orissa and Chattisgarh (Table 2).

Table 2: Composite score values of selected variables of quality of health impacting IMR in EAG states, 2005-06.

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X
Assam	1.384	0.73	0.448	0.921	1.45	0.134	0	0.132	0.314	1.262	6.775
Bihar	0.537	0.45	0.199	0.146	2.883	0.042	0.004	0.134	0.328	0.28	5.003
Chattisgarh	0.595	0.434	0.143	0.146	1.558	0.112	0.003	0.418	0.974	2.46	6.843
Jharkhand	0.528	0.429	0.183	0.151	0.57	0.049	0.004	0.156	0.342	1.156	3.568
Madhya Pradesh	0.589	0.417	0.524	0.187	1.484	0.047	0.002	0.498	0.806	0.216	4.7705
Orissa	1.263	0.414	1.068	0.153	1.568	0.369	0.002	0.951	1.036	1.088	7.912
Rajasthan	0.5505	0.734	0.592	0.193	1.636	0.126	0.023	0.538	0.265	1.372	6.0295
Uttarakhand	2.265	0.9	0.652	0.148	2.622	0.381	0.004	0.554	0.23	0.312	8.068
Uttar Pradesh	1.211	0.72	0.206	0.103	2.811	0.027	0.001	0.123	1.8	1.026	8.028
Mean= 6.33 Standard Deviation= 1.61											

Source: Computed and Compiled by the Author

The mean value of the composite score is 6.33 along with the standard deviation of 1.611 (Fig 5) and the levels of quality of health has been classified into four groups (Table 3) with the higher number indicating better performance of the health factors that affect IMR.

Table 3. Grouping of the composite score values indicating the quality of health affecting IMR in EAG states, 2005-06.

Statistical Values	Composite Scores	States	Quality of Health
Mean +1 SD to Mean +2SD	7.94 to 9.55	Uttarakhand, Uttar Pradesh	Good
Mean to Mean +1SD	6.33 to 7.94	Chattisgarh, Orissa, Assam	Medium
Mean- 1 SD to Mean	4.72 to 6.33	Rajasthan, Madhya Pradesh, Bihar	Poor
Mean-2SD to Mean- 1SD	3.11 to 4.72	Jharkhand	Very Poor

Source: Computed and Compiled by the Author

Table 4: Composite scores values of selected variables of quality of health impacting IMR in EAG states (2015-16).

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X
Assam	1.55	0.51	1.41	0.95	1.78	0.36	0.02	0.54	0.47	1.27	8.87
Bihar	0.64	0.30	0.64	0.25	2.95	0.03	0.02	0.42	1.23	1.07	7.55
Chattisgarh	1.52	0.53	1.40	0.33	2.73	0.65	0.09	1.27	2.29	2.32	13.14
Jharkhand	0.69	0.32	0.62	0.24	0.78	0.08	0.02	0.44	1.24	1.30	5.73
Madhya Pradesh	1.41	0.57	2.42	0.34	1.69	0.23	0.03	0.55	0.54	1.16	8.94
Orissa	1.52	0.26	2.56	0.29	1.78	0.69	0.21	1.47	2.36	2.06	13.20
Rajasthan	1.42	0.54	2.52	0.90	1.71	0.10	0.01	1.27	0.55	1.16	10.18
Uttarakhand	2.51	0.55	0.69	1.94	2.79	0.23	0.02	1.10	1.15	1.02	11.99
Uttar Pradesh	1.43	0.51	0.68	0.70	2.89	0.06	0.01	1.08	0.51	0.42	8.28
Mean= 9.77 Standard Deviation=2.58											

Source- Computed and Compiled by the Author.

The mean value of the composite score is 9.77 while the standard deviation derived is 2.58 (Fig. 6) and accordingly the values have been divided into four classes (Table 5).

Table 5. Grouping of the composite score values indicating the quality of health affecting IMR in EAG states, 2015-16

Statistical Values	Composite Scores	States	Quality of Health
Mean +1 SD to Mean +2SD	12.35 to 14.93	Chattisgarh, Orissa	Good
Mean to Mean +1SD	9.77 to 12.35	Rajasthan Uttarakhand	Medium
Mean- 1 SD to Mean	7.19 to 9.77	Uttar Pradesh, Bihar, Madhya Pradesh, Assam	Poor
Mean-2SD to Mean- 1SD	4.61 to 7.19	Jharkhand	Very Poor

Source- Computed and Compiled by the Author.

The proportion of children age 12-23 fully immunized with doses of BCG, measles and three doses each of polio and DPT is more evincible in the states of Orissa, Rajasthan and Assam and it has risen considerably from 2005-06 to 2015-16 under the mission Indradhanush. It has

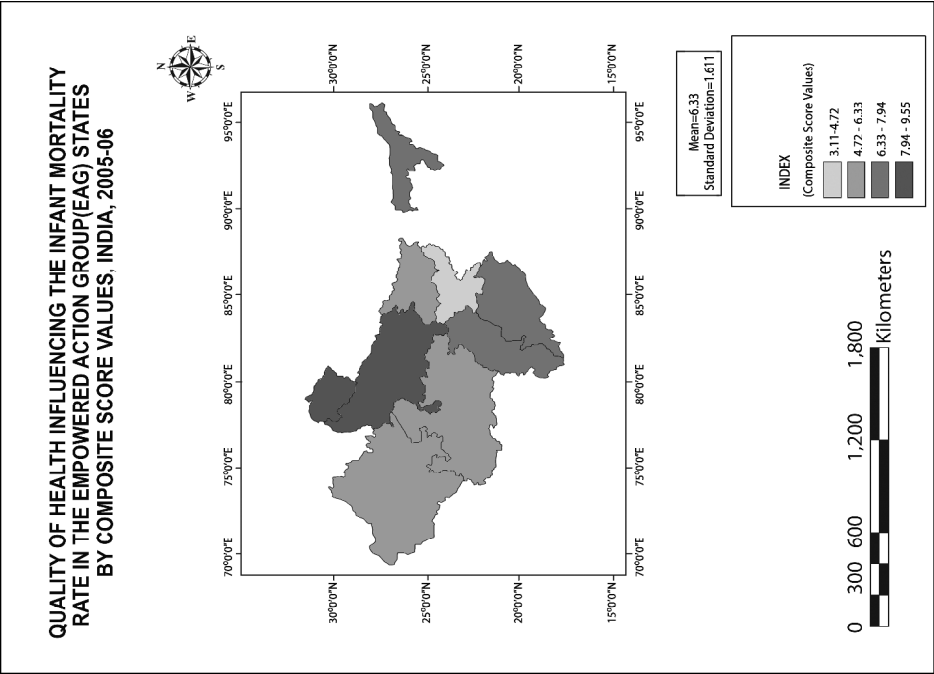


Fig 5. Quality of Health Affecting IMR in EAG states, 2005-06

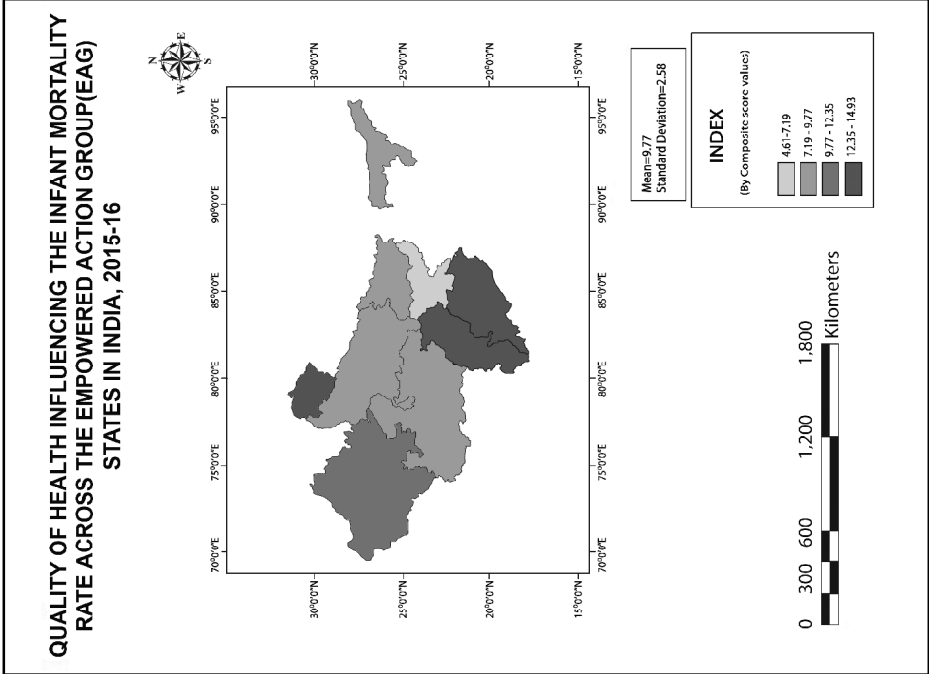


Fig 6. Quality of Health Affecting IMR in EAG states, 2015-16.

less proportion in the rural areas. The health parameter of improved sanitation facility includes flush to piped sewer system, flush to septic tank, flush to pit latrine, ventilated improved pit or biogas latrine, pit latrine with slab, twin pit or composting toilet, which is not shared with any other household. It is very less in the rural areas of Bihar, Jharkhand and Madhya Pradesh hence comparatively bad scenario of IMR here where the people prefer open defecation and also forming open dumping which pollutes the water sources and hence the majority of infants suffer from the problem of water borne diseases in these states. The condition of safe drinking water availability have improved greatly with the implementation of various schemes by the local and national government ensuring piped or municipal water supply primarily in the states of Orissa, Assam, Uttar Pradesh but comparatively very less in the stat of Jharkhand, Bihar and Madhya Pradesh. The health parameter of children under 6 months exclusively breastfed is an important parameter as it contributes to the strengthening of the infants body and determines his or her growth in the initial stages. Since the nutritional status of pregnant women in the states of Bihar, Madhya Pradesh and Jharkhand is very low compared to the other EAG states so the women over here also go for less breastfeeding which automatically contributed to weakening of the infants there increasing the chances of IMR. What can be inferred from the above analysis that while transitioning from 2005-06 to 2015-16, the health parameters affecting Infant Mortality rate has improved in the states like Orissa and Chhattisgarh which has lowered the IMR and that is reflected in the higher values of composite score values as opposed to Jharkhand where the scenario is deplorable.

Rural Urban Dichotomy in Terms of Quality of Health Affecting Infant Mortality Rate in the EAG States, 2015-16

In case of Orissa the rural and urban performance in the terms of ten factors are such that it is better off than the other EAG states. Institutional delivery in Orissa was recorded at 85.4% in NFHS-4, 2015-16 as against the national average of 78.9%. Similarly, 78.6% children aged between 12 and 23 months were fully immunised in the State as against the national average of 62%. Orissa has achieved a sharp increase in institutional deliveries, family planning and antenatal care of mothers. MAMATA scheme has been launched which is a conditional cash transfer scheme for pregnant women and lactating mothers of the State government that has made a significant contribution in ensuring safe deliveries and healthy infants. Only in those parts of Orissa where the tribal communities are residing there the performance of health indicators is not that good as they due to poverty they have high rates of malnutrition which is a big cause of infant mortality.

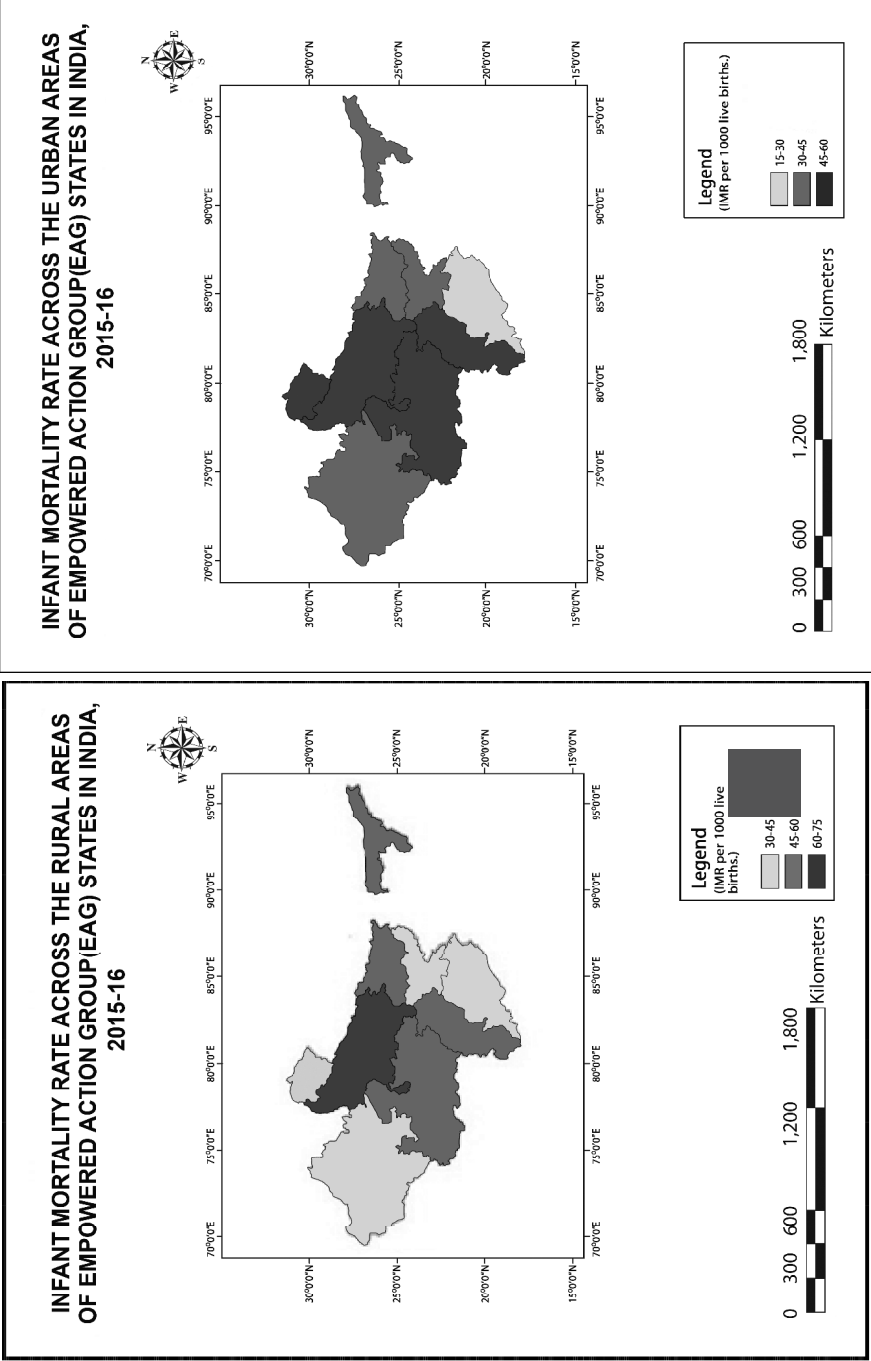


Fig 7 . Distribution of IMR in rural and urban areas of EAG states, 2015-16.

Table 6: Composite scores values of selected variables of quality of health impacting IMR in urban areas of EAG states (2015-16)

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X
Assam	2.703	0.179	2.781	1.244	0.891	0.912	2.142	0.018	2.127	1.346	14.42
Bihar	0.797	0.222	0.743	0.549	2.934	0.066	1.052	0.021	1.194	0.468	7.44
Chattisgarh	2.619	0.176	1.666	1.288	2.919	0.873	2.241	0.183	2.547	2.211	16.72
Jharkhand	1.673	0.216	1.632	0.59	0.886	0.358	1.166	0.01	1.34	1.108	8.97
Madhya Pradesh	1.662	0.412	2.814	1.332	2.904	0.39	1.342	0.201	1.26	1.084	13.4
Orissa	2.6055	0.474	1.794	1.22	2.859	0.813	2.208	0.08	2.25	1.286	15.6
Rajasthan	1.682	0.372	2.709	2.175	1.834	0.35	2.139	0.082	1.218	1.226	13.16
Uttarakhand	1.6	0.465	0.791	2.199	2.967	0.312	1.322	0.108	0.536	1.024	11.32
Uttar Pradesh	1.6	0.528	2.151	1.368	1.852	0.135	1.258	0.011	1.13	0.356	9.82
Mean= 12.32 Standard Deviation= 2.96											

Source- Computed and Compiled by the Author.

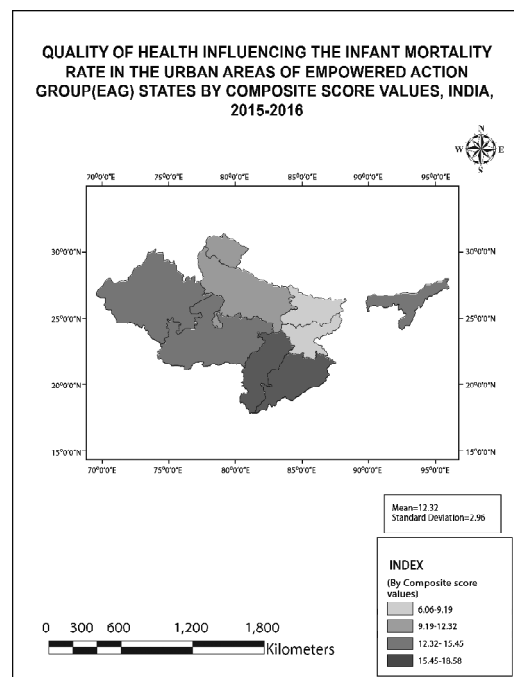


Fig. 8. Quality of Health Affecting IMR in urban regions of the EAG states, 2015-16.

The mean value of the composite score is 12.32 while the standard deviation derived is 2.96 (Fig 8) and accordingly the values have been divided into four classes for the urban areas of the EAG states (Table 7).

Table 7. Grouping of composite score values indicating quality of health affecting IMR in urban areas of EAG states 2015-16.

Statistical Values	Composite Scores	States	Quality of Health
Mean +1 SD to Mean +2SD	15.45 to 18.55	Chattisgarh, Orissa, Assam	Good
Mean to Mean +1SD	12.32 to 15.45	Rajasthan, Madhya Pradesh	Medium
Mean- 1 SD to Mean	9.19 to 12.32	Uttarakhand, Uttar Pradesh	Poor
Mean-2SD to Mean- 1SD	6.06 to 9.19	Bihar, Jharkhand	Very Poor

Source- Computed and Compiled by the Author

What is perhaps most shocking about the findings is that among the eight Empowered Action Group, Uttarakhand is the lone state which has not shown any improvement. Among the districts with high IMR were Dehradun, Nainital and Haridwar. Research shows that with high influx of migrants from the hilly region to this contributes to high IMR as people are forced to live in cramped spaces in slums and in unhygienic condition. However, the health facilities in the state, especially in the hills women die while being in labour on the way to hospital and this is prominent in the rural areas mostly. The share of women receiving full antenatal care is very less about 12% which is very less followed by 19% of children receiving a health check from a professional within two days of birth . Although the immunization coverage has increased but the scenario in rural urban areas seem to be otherwise .

There has been an increase of institutional deliveries from 32.6% in 2005-06 to around 69% in 2015-16 (Rawat and Belwal, 2016). However, Haridwar and Udham Singh Nagar are two districts where the situation is bad.

The infant mortality rate registered only a minor decline between 2005-06 and 2015-16, from 42 to 40 deaths per 1000 live births. Apart from the tremendous increase in institutional deliveries over the past decade, most health indicators remain low like, only 58 percent of children in the state are fully immunized, in rural areas only 9 % of the rural women receive full antenatal care compared to 16 percent of women in urban areas. It is noteworthy that Uttarakhand is one such state where the urban IMR is higher than that of rural IMR.

Table 8: Composite scores values of selected variables of quality of health, impacting IMR in rural areas of EAG states, 2015-16

	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X
Assam	2.19	0.54	1.364	1.353	1.658	0.332	0.019	0.519	0.444	1.262	9.68
Bihar	0.608	0.318	1.254	0.207	2.946	0.033	0.017	0.411	1.238	0.542	7.57
Chattisgarh	2.166	0.592	1.336	0.226	1.784	0.392	0.09	1.21	2.229	2.346	12.37
Jharkhand	0.637	0.354	0.573	0.124	0.74	0.055	0.023	0.409	1.214	0.451	4.58
Madhya Pradesh	0.650	0.318	2.292	0.194	0.795	0.083	0.021	0.503	0.502	1.192	6.55
Orissa	2.196	0.574	2.541	0.23	1.75	0.669	0.219	2.199	2.376	1.316	14.07
Rajasthan	0.662	0.598	2.469	0.712	1.666	0.074	0.008	1.23	0.531	1.15	9.10
Uttarakhand	1.373	0.6	1.274	1.788	1.79	0.094	0.016	0.491	1.164	0.51	9.10
Uttar Pradesh	1.36	0.562	1.336	0.232	2.934	0.038	0.007	0.516	0.504	0.431	7.92
Mean= 8.99											
Standard Deviation= 2.88											

Source- Computed and Compiled by the Author.

Table 9: Grouping of composite score values indicating quality of health affecting IMR in rural areas of EAG states, 2015-16

Statistical Values	Composite Scores	States	Quality of Health
Mean +1 SD to Mean +2SD	11.87 to 14.75	Orissa, Chattisgarh	Good
Mean to Mean +1SD	8.99 to 11.87	Assam, Rajasthan, Uttarakhand	Medium
Mean- 1 SD to Mean	6.11 to 8.99	Uttar Pradesh, Madhya Pradesh, Bihar	Poor
Mean-2SD to Mean- 1SD	3.23 to 6.11	Jharkhand	Very Poor

Source- Computed and Compiled by the Author.

The mean value of the composite score is 8.99 while the standard deviation derived is 2.88 (Fig. 9) and accordingly the values have been divided into four classes for the rural areas of the EAG states (Table 9).

Rajasthan has witnessed better performance in the health factors affecting IMR (Fig. 9). Chirayu programme was launched in Rajasthan primarily in the worst affected eight districts infested with high IMR which aimed at strengthening primary health centre, community health centres and at district hospitals across the state. The literacy rate in Rajasthan has also increased rapidly. The fall

in IMR can be attributed to the development of transport network which has allowed people to reach medical institutions on time and with time almost all the villages have now electricity and availability of drinking water has also improved the health factors that that which has contributed to good performance of the health factors affecting the IMR. The government also embarked upon universal immunization programme to protect newborns. About 83% children in the state have been completely vaccinated and those who have been deprived from complete immunisation are being immunised through Mission Indradhanush. An important factor for reduction in infant mortality may be improvement in the coverage of antenatal care, iron folic supplements and tetanus toxoid vaccine. The proportion of institutional deliveries has also increased at a rapid pace followed by an increase in access to skilled birth attendants. Rural areas still lag behind in terms of performance of health workers which can be covered by ASHA workers.

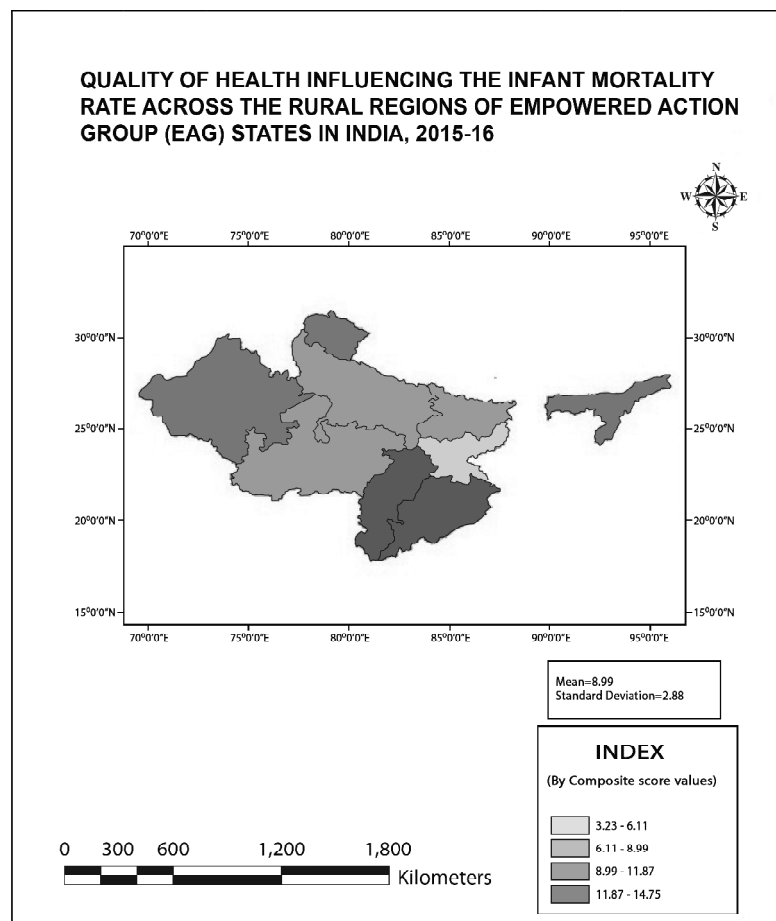


Fig 9. Quality of Health Affecting IMR in rural regions of the EAG states, 2015-16.

Despite being the country's most populous state, in the state of Uttar Pradesh many children are not fully immunised, and the state has the country's second-highest maternal mortality rate which contributes to high Infant mortality in the rural areas of Uttar Pradesh. Madhya Pradesh retains high IMR in the country due to problems arising from shortage of doctors to lack of proper primary healthcare infrastructure in rural areas. Other factors being responsible are malnutrition, poor maternal health care with less access to antenatal care. This can be attributed to less expenditure in public health system which has contributed to lower composite score value (Table-8). Most tribal districts in Madhya Pradesh report low nutrition and weak maternal health levels thus leading to high infant mortality rate.

The performance of the health factors in Chattisgarh has been quite appreciating except the rural areas as evincible from the composite score values of 12.37 (Table- 8). Overall Chattisgarh has recorded significant decrease in IMR and is attributed to the effective implementation of health services and Anganwadi services in the state let alone the tribal areas.

Although Bihar has witnessed a fall in IMR owing to increase in institutional deliveries by skilled birth attendants in government facilities, routine immunization, by 14 points but the rural urban dichotomy speaks otherwise. The rural areas are lagging behind by 16 points. Bihar has very few rural hospitals. Most of the hospitals are understaffed, poorly managed, overcrowded and unhygienic. Other factors which contribute to high IMR are low education rates, high malnutrition rates, poor infrastructure thereby leading to less coverage of immunization, less public expenditure as evincible from the low composite score value of 7.57.

Assam has witnessed marginal dip in IMR from 2005-06 to 2015-16 and this can be attributed to the hilly terrain in the state which becomes difficult for the ambulances to reach few places due to the hilly terrain and poor condition of roads. The IMR in rural areas in Assam is 46 while it is 21 in urban areas. The reason behind it is poor ante-natal and post natal care, lack of awareness about contraception and poor maternal health conditions. Uttar Pradesh has witnessed low dip in IMR because of less rise in institutional deliveries. Most of the children in the state is not fully immunised, and the state has India's second-highest maternal mortality rate after Assam.

In Jharkhand the IMR has reduced by 25 points from 2005-06 to 2015-16 which can be attributed to antenatal care being provided, rising institutional deliveries but the performance of rest of the health indicators is not that appreciable and out of all the EAG states, Jharkhand is lagging behind in terms of performance of all the health factors in both urban and rural areas. This can be attributed to malnutrition of mothers, lack of education and poor health expenditure followed by poverty. Amongst the tribal people residing in Jharkhand are among India's most disadvantaged communities, and their children are among the most malnourished. Poor nutritional status of mothers before conception followed by under nutrition and malnourishment and poor nutrition of lactating mothers during pregnancy contributes to high IMR. Most of the women belonging to scheduled tribe of Jharkhand deliver their babies at places other than medical institutions. The situation of

Scheduled Tribes is also not good when it comes to fully immunising their children (Singh and Ram 2006). Children born in families with low socio-economic status are at greater risk of mortality than those born in advantaged groups which is mostly observed in the rural areas. (Baqui et al. 2007).

Conclusion

Infants born in poorer families tend to die in larger numbers. The poor are the most vulnerable to health disadvantages and the IMR tends to reflect that. What can be inferred from the above work is that although in terms of decadal growth rate the EAG states have registered negative decline but it is more in Orissa, Chattisgarh and Assam. However in the terms of composite score values showing the quality of health it can be concluded that Orissa has witnessed sharp decline in IMR and that both in rural and urban areas the performance of the health factors affecting Infant mortality is better off followed by Chattisgarh. Although Jharkhand has witnessed drop in overall IMR but it is to be taken into account that the performance of the health factor is highly dismal in both rural and urban areas in comparison to Bihar, a state which has also witnessed negative growth rate in infant mortality but outpaces Jharkhand. This is followed by deplorable performance of the health factors in both the urban and rural areas of Uttar Pradesh and Uttarakhand. Based on this research analysis it can be concluded that Orissa is a 'prosperous region' followed by Chattisgarh that Jharkhand is a 'problem region' followed by Bihar, Uttar Pradesh and Uttarakhand. So the policy framework should be such that Government should invest in these states in order to contain the Infant Mortality Rate and ensure better performance of the health factors that which will sustain the life of the infants.

References

- Allotey, D. D. (2013). Infant mortality rate as an indicator of population health. *Journal of Epidemiology and Community Health*, 57(5), 344-346.
- Ariana Vitale, A. M. (2016). Infant Mortality: A Leading Health Indicator. *Journal of Bioprocessing and Biotechniques*, 6(9), 6-9.
- Ashish Kumar Gupta, L. L. (2016). Spatial clustering and risk factors of infant mortality: district-level assessment of highfocus states in India. *Genus*, 72(2), 1-17.
- Basu, A. D. (2016). Status of Maternal and Child Health in Empowered Action Group of Indian States: a Spatio-Temporal Analysis. *International Journal of Development Research*, 6(10), 9798-9803.
- Belwal, R. R. (2016). Seasonal Variation for Infant Mortality: A Study of Haridwar District of Uttarakhand. *International Journal of Research in Social Sciences*, 6(7), 9-22.
- Brahmapurkar, K. P. (2019). High Under-five Mortality Rate in Rural Madhya Pradesh, Time to Identify High-Risk Districts Using National Family Health Survey-4 Data with Comparison to Low Under-five Mortality Rate in Rural Tamil Nadu, India. *International Journal of Preventive Medicine*, 157-177.
- Chari, E. a. (2018). Health care at birth and infant mortality: Evidence from nighttime deliveries in Nigeria. *Social Science and Medicine*, 196, 86-95.

- Choudhury, P. K. (2013). Parental Education and Infant Mortality in India: Understanding the Regional Differences. *Public Health Foundation of India*, 1-16.
- Damodar Sahu, S. N. (2015). Levels, trends & predictors of infant & child mortality among Scheduled Tribes in rural India. *Indian Journal of Medical Research*, 141(5), 709-719.
- Dharmendra Kumar Dubey*, D. C. (2016). An Epidemiological Model Investigating the Association between Mothers Nutritional Status and Low Birth Weight in India. *Health*, 8(3), 251-261.
- Kulasekaran, R. A. (2012).) Influence of mothers' chronic energy deficiency on the nutritional status of preschool children in Empowered Action Group states in India. *International Journal of Nutrition, Pharmacology, Neurological Diseases*, 2(3), 198-209.
- Latika Nath, P. K. (2015). Evaluation of the universal immunization program and challenges in coverage of migrant children in Haridwar, Uttarakhand. *Indian Journal of Community Medicine*, 40(4), 239-245.
- Mishra, K. S. (2016). Pattern and Determinants of Infant Mortality rate in Odisha State, India. *Annals NAGI Volume*, XXXVI(2), 141-158.
- Mukesh Ranjan, L. K. (2018). Infant Mortality among Tribes Population in India: Regional Analysis from Multiple Surveys. *Studies of Tribes and Tribals*, 16(1-2), 11-23.
- NanaMatobaMD, M. W. (2017). Racial disparity in infant mortality. *Seminars in Perinatology*, 41(6), 354-359.
- P D Kulkarni, V. K. (2016). Programmatic Factors affecting Infant and Child Mortality, in Madhya Pradesh: Issues and Challenges. *Asian Journal of Research in Social Sciences and Humanities*, 6(2), 22-46.
- Rege, S. S. (2011). Ante natal care services utilization, delivery practices and factors affecting them in tribal area of North Maharashtra. *Indian Journal of Community Medicine*, 36(4), 287-290.
- Singh R.L, S. R. (1979). *Spatial Planning in Indian Perspective*. N.G.S.I Research Bulletin.