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RESEARCH ARTICLE

UTILIZATION OF MATERNAL AND CHILD HEALTH SERVICES IN STATE OF JHARKHAND,  
INDIA: ROLE OF SOCIO-ECONOMIC AND REGIONAL CORRELATES

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ABSTRACT

Despite being a signatory to Millennium Declaration which also aims to improve maternal and child health care, India's performance remains unacceptably poor with large regional disparities. The wretched state of maternal and child health conditions in Jharkhand are blighting India's hard earned efforts to combat high maternal and child death rate on global platform. This study aims to explore linkages of poor maternal and child health conditions from a regional perspective along with other socio-economic dimensions. Findings of the paper show that Dhanbad, Bokaro, Hazaribagh, East Singhbhum and Ranchi districts bask high utilization of maternal and child health care services compared to Pakur, Godda, Shahibganj, Giridih, West Singhbhum districts which have high rural poverty and concentration of scheduled caste and tribe population. Logistic regression analysis highlights region, wealth, religion, caste, education as important covariates of full antenatal care, safe delivery, contraceptive use and child immunization.

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INTRODUCTION

Since the inception of family planning programme, India has made through lower fertility level with varying paces in different states but reproductive health condition remains unacceptably poor (Visaria *et al.*, 1999). Despite several government intervention programmes directly or indirectly focusing on reducing high maternal and child mortality rate, these issues remain a major cause of concern for India which is also a signatory of Millennium Declaration (2000) aiming to reduce maternal and child deaths. India may achieve a significant percentage of MDG goals by 2015 but some states bear a heavy burden of maternal and child deaths. The latest estimate of maternal mortality rate is 212 per lakh live births for India. However, it ranges from 390 in Assam to 81 in Kerala (Registrar General of India, 2011). Besides, it is also estimated that around 7.6 million children do not live up-to their 5th birthday worldwide (United Nations International Children's Emergency Fund [UNICEF], 2012) and India's share in it is maximum (UNICEF, 2011). Studies anticipate several factors affecting maternal and child health such as mother's education level (Jat *et al.*, 2011), economic status (Pathak *et al.*, 2010), caste (Mohindra *et al.*, 2006; Nayar, 2007; Mukherjee *et al.*, 2011), immunization, mother's age, gender (Xie and Dow, 2005; Kusuma *et al.*, 2010, Fatiregun and Okoro, 2010) and social structure (Sanneving *et al.*, 2012).

With large regional disparities in health, Jharkhand needs a special attention as it has maternal mortality rate of 261 compared to national average of 212 per 1 lakh live births (Ogala *et al.*, 2012). Numbers of infant deaths (38) and under five mortality (55) are also prominent in the state (Office of the Registrar General and Census Commissioner, 2011-12). Famous for its rich minerals, resources, forest and culture Jharkhand has 46.2 percent population constituting of scheduled tribes (ST) and scheduled caste (SC) living below poverty line (Roy, 2012). Multiple deprivation places this state at the bottom of development ladder. Jharkhand's rank on Human Development Index is 19 out of 23 states and on Gender Development Index it is ranked 29 out of 35 states (United Nation Development Programme, n.d.).

Numerous studies focus on interregional disparities only at state level and there is a lacuna in health literature which centers around district level disparities. Improving maternal and child health becomes important to expedite the progress towards achieving millennium development goals on one hand and contributing nation's overall development on social sector on the other hand. Consequently, studies focusing on regional inequalities at grass root level are the need of an hour. This paper aims to examine regional pattern of utilization of maternal and child health services and their correlates in Jharkhand.

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## MATERIALS AND METHODS

### Data and Sampling

The present study utilizes data from third round of District Level Household and Facility Survey (DLHS-3) covering 601 districts from 34 states and union territories in India. In state Jharkhand, DLHS 3 survey covered 26886 married women and their 3418 children. DLHS 3 survey used multi-stage stratified sampling design. In each districts, 50 Primary Sampling Unit (PSUs) which are census village from rural areas and wards from urban areas were selected in the first stage by systematic probability proportional to size (PPS) sampling. At the second stage of the survey, systematic sampling is used for selecting required number of household within selected village.

### Outcome measurements

The study measures four outcome variables namely full antenatal care, safe delivery, contraception use and full child immunization as the indicators of maternal and child health care utilization. The four selected indicators of maternal and child health care and their components are considered on the basis of the guidelines developed by the Ministry of Health and Family Welfare, Government of India (2011). Full antenatal care includes mothers who had at least three antenatal care visits, at least two tetanus toxoid injections during pregnancy and received folic acid tablet for 90 days or more. Deliveries conducted either in medical institution or home delivery assisted by doctor/nurse/Lady Health Visitor/Auxiliary Nurse Midwife/other health professionals are termed as safe delivery. Contraception usage includes both modern and traditional methods of preventing pregnancy. Child health care is considered as vaccination of the children (12-23 months) who received three dose of polio, three DPT (Diphtheria, Pertussis and Tetanus), measles and BCG (Bacillus Calmette Guerin).

### Defining Predictors Variables

Socioeconomic and demographic predictors such as place of residence, caste, religion, age of women, marital status, women's education, women's age at marriage, age at first birth, birth order, sex of a child, mass media exposure, wealth quintiles, and regions were included as predictors variables in the study. Household wealth index was calculated from combining household amenities, assets and durables using factor analysis (Ministry of health and family welfare, 2007-08). Regions were grouped into five category through clubbing the districts, namely North-East (Dumka, Pakur, Godda, Sahibganj, Deoghar and Jamatra), South (East Singhbhum, West Singhbhum, Seraikella and Simdega), West (Gumla, Lohardaga, Latehar and Garhwa), North (Palamu, Chatra, Kodarma and Giridih) and Central (Dhanbad, Bokaro, Hazaribagh and Ranchi) regions.

### Analytical Approach

Logistic regression analysis was performed to examine impact of selected socio-economic and demographic background characteristics on maternal and child health care services. The binary response (y, full antenatal care received or not; undergone safe delivery or not; contraception used or not; received full child immunization or not) for each individual

was related to a set of categorical predictors, X, and a fixed effect by a logit link function which is as following.

$$\text{Logit}(\pi_i) = \log \left[ \frac{\pi_i}{1-\pi_i} \right] = \beta_0 + \beta(X) + \varepsilon$$

Where,

The probability of an individual who had received each indicators of maternal and child health is denoted by  $\pi_i$ . The parameter  $\beta_0$  estimates the log odds of each maternal and child health indicators for the reference groups, and  $\beta$  estimates with maximum likelihood. The differentials log odds of each maternal and child health care indicators are associated with the predictors X, as compared to reference groups and  $\varepsilon$  represents the error term in the model. The results of logistic regression are presented by estimated odd-ratio with 95% Confidence Interval (CI). Geographical Information System (GIS) is used to show pattern of utilization of maternal and child health care services across the state. The whole analysis was performed using STATA version 12.0. Composite index covering three maternal and one child indicators has been constructed using following formula:

$$\frac{\text{Observed value} - \text{Minimum value}}{\text{Maximum value} - \text{Minimum value}}$$

### Socio-economic and demographic profile of Jharkhand

This section attempts to exhibit regional disparities on some social and development indicators across all districts of the state with a view to easily link improvement on maternal and child health services. There are 24 districts in the state<sup>1</sup> and all of them show distinct level of development. Around 46 percent of the state's rural population lives below poverty line and its percentage are higher in Lohardaga, Pakur, Gumla, Sahibganj, east Singhbhum, Chatra, Latehar and Dumka districts. Among them Lohardaga, Pakur, Gumla and Dumka districts have highest percentage of ST whereas Chatra and Latehar districts comprise maximum number of SC population (Table 1). West Singhbhum, Gumla, Deogarh, Garhwa and Godda districts show high urban poverty rate. Districts such as Pakur, Lohardaga, Sahibganj, Dumka, Simdega and west Singhbhum exhibit high under-weight level among children aged 5 years. Jharkhand state shows 56.6 percent stunted children whose percentage is high in Garhwa, Dumka, Kodarma, Deoghar, Pakur, Sahibganj, Lohardaga and Gumla districts. As far as female literacy is concerned in Jharkhand Ranchi, Ramgarh, east Shighbhum, Dhanbad, Bokaro districts show high female literacy whereas Pakur, Sahibganj and Godda districts are top 3 worst performers. There are 948 females per 1000 males in Jharkhand according to recent 2011 census estimates. West Singhbhum, Simdega, Gumla, Khunti districts show high sex ratio compared to other districts. However, there are lesser differences in sex ratio across all districts. This analysis clearly shows that Lohardaga, Pakur, Gumla, Sahibganj and Dumka districts perform worse on most of the indicators. High percentage of SC/ST is clearly related to high poverty level. Results from this analysis need to be confirmed with other data sources as information of some districts are not available.

<sup>1</sup> This section covers 24 districts. Although DLHS-3 survey covers 22 districts, hence rest of the analysis is based on 22 districts.

Table 1. Socio-economic characteristics of districts of Jharkhand, India

Districts	Sex ratio*	Literacy*		% Wasting#	% Underweight#	% Stunting#	Estimated Head Count Ratio @		Social group*	
	(female/1000 male)	Male (%)	Female (%)	Weight-for Height (<-2 SD)	Weight-for Age (<-2 SD)	Height-for Age (<-2 SD)	Rural Poverty	Urban Poverty	% SC	% ST
Garhwa	933	74	49.4	12.76	48.56	63.27	38.6	38.3	24.2	15.6
Chatra	951	71.9	51.9	16.96	41.03	50.4	55.2	28.9	32.7	4.4
Kodarma	949	81.3	54.8	8.34	41.58	62.38	38.1	30.7	15.2	1.0
Giridih	942	79.1	50.3	16.24	41.93	53.78	30.5	1.9	13.3	9.7
Deoghar	920	79.1	52.4	17.56	47.82	57.68	58.7	38.8	12.7	12.1
Godda	932	69.6	44.9	12.02	39.09	50.96	41.3	37.8	8.8	21.3
Sahibganj	947	62.7	44.3	12.16	46.09	60.34	63.7	29.9	6.3	26.8
Pakur	984	59	41.2	17.6	51.14	57.28	75.6	6.7	3.30	42.2
Dhanbad	908	85.7	64.7	18.21	46.01	51.3	19.3	21.6	16.3	8.7
Bokaro	915	84.5	61.5	NA	NA	NA	52.4	9.2	14.5	12.4
Lohardaga	985	78.6	57.9	15.57	47.43	60.63	81.6	30.2	3.3	56.9
East Singhbhum	948	84.5	67.3	NA	NA	NA	58.4	12.2	4.9	28.5
Palamu	928	76.3	53.9	12.94	40.97	52.68	54.3	29.2	27.7	9.4
Latehar	963	71.8	50.3	NA	NA	NA	NA	NA	21.3	45.6
Hazaribagh	945	81.2	59.3	NA	NA	NA	28.3	15.9	17.5	7.0
Ramgarh	921	83.5	63.5	NA	NA	NA	NA	NA	11.2	21.2
Dumka	974	75.2	49.6	12.37	45.83	63.65	55.4	4.2	6.0	43.2
Jamtara	958	76.9	50.1	NA	NA	NA	NA	NA	9.2	30.4
Ranchi	950	85.6	68.2	NA	NA	NA	23.2	18.6	5.3	35.8
Khunti	994	75.3	53.7	NA	NA	NA	NA	NA	4.5	73.5
Gumla	992	76.9	57	20.03	49.62	58.44	68.6	45.2	3.2	68.9
Simdega	1000	75.8	59.4	NA	NA	NA	NA	NA	7.4	70.8
West Singhbhum	1004	72.2	47	26.53	49.31	51.44	53.8	51.3	3.8	67.3
Seraikella	957	81	56.2	NA	NA	NA	NA	NA	5.3	35.2
Jharkhand	948	78.5	56.2	15.66	45.4	56.6	46.2	20.3	12.1	26.2

Source: \*Census of India, 2011; # HUNGaMA Report, 2011; @ Choudhary and Gupta, 2009

## RESULTS

### Profile of the Respondent

Table 2 shows weighted percentage distribution of married women by background characteristics in Jharkhand state. Results exhibit that 86 percent married women are living in rural areas and only 14 percent women in urban areas. 14 percent married women of the state belong to SC, 33 percent ST, 42.3 percent Other Backward Class (OBC) and only 10.8 percent women are related to other caste. Among religious groups: Hindu, Muslim, Christian and Other women comprise 68.9, 10.1, 6.0, 15.0 percentage respectively. In Jharkhand, 96 percent women are currently married and level of child marriage is high as 73 percent married women got married when they were less than 18 years. Most of the married women of the state belong to poor category as table 2 shows that 40.4 percent women belong to poorest wealth quintile followed by 28 percent poor and only 8.7 percent women are related to richest wealth quintile. Jharkhand has 39 percent women who are secondary pass.

### Regional Differences in Utilization of Maternal and Child Health Care Services

Table 3 shows inter-district differences in utilization of maternal and child health care services in state of Jharkhand. High utilization of full antenatal care and acceptance of contraception are found in district Dhanbad followed by Bokaro and east Singhbhum. District performing lowest on full antenatal care is Gumla (1.8%) followed by Pakur, west Singhbhum, Godda and Garhwa. In addition to ANC care, utilization of safe delivery services is highest in east Singhbhum district where 53.2% women use safe delivery care followed by Dhanbad, Kodarma, Hazaribagh and Bokaro districts. Districts which experience lowest safe delivery care utilization are Sahibganj (11.1%) followed by Pakur (14.1%) and Latehar (16.4%). In context of child immunization, districts which have performed better are Lohardaga (83%) followed by Seraikella, east Singhbhum, Latehar, Hazaribagh. Performance of child immunization was not satisfactory in districts namely Giridih, Deoghar, Godda, Sahibganj and Pakur.

Table 2. Percentage distribution of married women (15-49) by background characteristics, Jharkhand

Background Characteristics	%	Number
<i>Place of residence</i>		
Rural	86.0	23,127
Urban	14.0	3,759
<i>Caste</i>		
SC	14.0	3,761
ST	32.9	8,823
Other backward caste	42.3	11,357
Others	10.8	2,910
<i>Religion</i>		
Hindu	68.9	18,521
Muslim	10.1	2,727
Christians	6.0	1,605
Others	15.0	4,031
<i>Age group</i>		
15-24	25.7	6,899
25-34	48.5	13,050
35-49	25.8	6,937
<i>Marital status</i>		
Currently married	95.9	25,775
Others	4.1	1,111
<i>Education</i>		
Primary	30.9	3,026
Secondary	38.9	3,813
Higher Secondary	30.3	2,970
<i>Age at marriage</i>		
<18	73.1	19,663
18+	26.9	7,223
<i>Age at first birth</i>		
<20	69.1	16,419
20+	30.9	7,332
<i>Birth orders</i>		
1	26.1	2,972
2	23.6	2,689
3	19.1	2,175
4+	31.3	3,566
<i>Sex of a child</i>		
Boy	52.4	6,017
Girl	47.6	5,458
<i>Wealth quintiles</i>		
Poorest	40.4	10,863
Poorer	28.0	7,540
Middle	13.5	3,620
Richer	9.4	2,527
Richest	8.7	2,336
Total		26,886

Source: Authors' calculation from DLHS 3 unit level data

Table 3. Regional differences in utilization of maternal and child health care among married women (15-49) in Jharkhand, 2007-08

Districts	Full antenatal care (%)	Number	Safe delivery (%)	Number	Contraceptive used (%)	Number	Child immunization (%)	Number
Ranchi	7.1	323	29.7	323	38.2	810	68.3	86
East Singhbhum	12.6	262	53.2	262	50.2	825	79.8	66
Dhanbad	18.2	347	46.2	347	50.9	912	50.1	108
Bokaro	12.8	430	34.0	430	50.5	1,183	56.7	129
Simdega	2.6	544	20.0	544	26.4	1,104	63.6	162
Hazaribagh	6.9	438	39.6	438	47.6	1,195	74.1	142
Lohardaga	3.6	471	31.1	471	34.7	1,030	83.0	126
Gumla	1.8	570	15.7	570	32.8	1,157	65.6	166
Seraikella	9.5	401	32.2	401	37.5	1,172	80.1	114
Kodarma	8.3	567	41.9	567	32.0	1,188	47.9	165
Palamu	4.5	665	25.7	665	40.2	1,399	54.8	195
Deochar	3.5	546	22.7	546	36.2	1,330	34.1	158
Chatra	3.8	631	23.1	631	32.8	1,420	46.6	212
Latehar	2.7	706	16.4	706	32.7	1,510	75.9	217
Giridih	9.5	702	23.3	702	24.0	1,502	25.9	235
Jamatra	11.9	570	23.5	570	32.8	1,461	44.0	191
Dumka	3.9	544	18.1	544	33.8	1,318	50.4	155
Garhwa	2.9	553	22.5	553	45.6	1,276	65.7	149
West Singhbhum	2.2	536	23.9	536	24.5	1,265	51.2	153
Godda	2.7	552	16.5	552	21.7	1,394	35.1	174
Sahibganj	2.7	524	11.1	524	27.8	1,219	36.4	154
Pakur	2.0	592	14.1	592	16.2	1,216	46.9	161
Total	5.6	11474	24.9	11474	39.4	26,886	54.0	3,418

Source: Authors' calculation from DLHS 3 unit level data

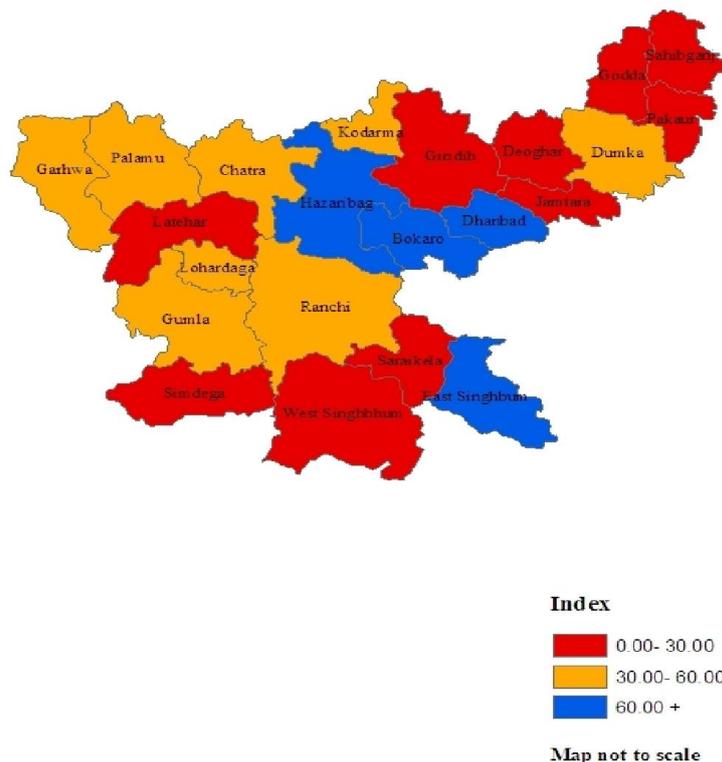
**Table 4. Composite indices of maternal and child health services in districts of Jharkhand, 2007-08**

Districts	Index of Full antenatal care	Index of Safe delivery	Index of Contraceptive used	Index of Child immunization	Composite index of maternal and child health	Composite Index (%)
Pakur	0.017	0.071	0.000	0.368	0.114	11.4
Godda	0.059	0.130	0.157	0.162	0.127	12.7
Sahibganj	0.056	0.000	0.334	0.184	0.143	14.3
Giridih	0.475	0.291	0.224	0.000	0.247	24.7
West Singhbhum	0.030	0.306	0.239	0.443	0.255	25.5
Deoghar	0.105	0.277	0.577	0.143	0.275	27.5
Simdega	0.050	0.212	0.292	0.660	0.304	30.4
Dumka	0.129	0.166	0.508	0.428	0.308	30.8
Chatra	0.125	0.284	0.477	0.363	0.312	31.2
Gumla	0.000	0.110	0.478	0.695	0.321	32.1
Latehar	0.057	0.127	0.476	0.875	0.384	38.4
Jamatra	0.620	0.295	0.477	0.318	0.427	42.7
Palamu	0.168	0.347	0.690	0.506	0.428	42.8
Garhwa	0.069	0.272	0.846	0.697	0.471	47.1
Kodarma	0.399	0.731	0.454	0.386	0.493	49.3
Lohardaga	0.113	0.475	0.532	1.000	0.530	53.0
Ranchi	0.327	0.443	0.634	0.743	0.537	53.7
Seraikella	0.471	0.501	0.615	0.949	0.634	63.4
Hazaribagh	0.311	0.677	0.906	0.844	0.684	68.4
Bokaro	0.673	0.544	0.988	0.538	0.686	68.6
Dhanbad	1.000	0.834	1.000	0.424	0.815	81.5
East Singhbhum	0.661	1.000	0.981	0.944	0.897	89.7
Jharkhand	0.473	0.360	0.183	0.866	0.470	47.0

Source: Authors' calculation from DLHS 3 unit level data

Table 4 shows composite index using maternal and child health care indicators across districts. They have been arranged in ascending order showing their performance from worst to best. Districts which have lowest performance on maternal and child health services are Pakur (11.4%) followed by Godda, Shahibganj, Giridih, west Singhbhum and Deoghar. Some districts such as Simdega, Dumka, Chatra, Gumla and Latehar exhibit a moderate performance on health related indicators. Further analysis reveals that districts which performed best on utilization of maternal and child health care indicators were east Singhbhum, (89.7%) followed by Dhanbad (81.5%), Bokaro (68.6%) and Hazaribagh (68.4%). The analysis of

composite index is also represented through a map which easily brings out regional differences in maternal and child health indicators in Jharkhand (Figure 1). The above analysis clearly draws a picture of regional differences in utilization of maternal and child care services in Jharkhand. Some districts such as east Singhbhum, Dhanbad, Bokaro and Ranchi relatively perform better on all selected maternal and child health indicators. These districts are also hub of industrial development which has probably brought economic development, high standard of living and resultant improved health outcomes.



**Figure 1. Spatial pattern of maternal and child health services in districts of Jharkhand, 2007-08**

There are the districts such as Pakur, Sahibganj, west Singhbhum, Godda where conditions of maternal and child health are worse and these districts also show high concentration of ST population. They constitute backward regions of the state hence, especial focus of related policies/programmes and government will is needed to bring these districts with the mainstream.

### Determinants of Maternal and Child Healthcare Utilization

Table 5 shows multivariate results for utilizing maternal and child care services (full antenatal care, safe delivery, contraceptive use and child Immunization) in Jharkhand state.

Some important factors such as women's education, birth order, economic status and regions of residence are found to be significant determinants in utilizing full antenatal care services among married women in Jharkhand. Women with secondary and higher secondary were one (OR=1.344) and two (OR=2.387) times respectively more likely to utilize full antenatal care services than primary educated women. Similarly, women with birth order three and over four were less likely (OR 0.458 and 0.448 respectively) to utilize full antenatal care than women with first birth order.

**Table 5. Binary logistic regression showing maternal and child health care utilization in Jharkhand, India, 2007-08**

Background Characteristics	Full antenatal care	Safe Delivery	Contraceptive Use	Full Child Immunization
<i>Place of Residence</i>				
Rural (ref)				
Urban	1.059 <sup>ns</sup>	1.267*	0.754**	.937 <sup>ns</sup>
<i>Caste</i>				
SC (ref)				
ST	1.473 <sup>ns</sup>	0.748 <sup>ns</sup>	0.682**	0.892 <sup>ns</sup>
Other backward caste	1.227 <sup>ns</sup>	1.164 <sup>ns</sup>	1.096	1.152 <sup>ns</sup>
Others	1.213 <sup>ns</sup>	2.274***	1.287*	1.459 <sup>ns</sup>
<i>Religion</i>				
Hindu (ref)				
Muslim	1.000 <sup>ns</sup>	0.722**	0.564***	0.625**
Christians	.663 <sup>ns</sup>	0.772 <sup>ns</sup>	0.847 <sup>ns</sup>	0.710 <sup>ns</sup>
Others	.653 <sup>ns</sup>	1.107 <sup>ns</sup>	1.135	0.677 <sup>ns</sup>
<i>Age group</i>				
15-24 (ref)				
25-34	0.976 <sup>ns</sup>	1.228*	1.569***	1.191 <sup>ns</sup>
35-49	1.354 <sup>ns</sup>	2.100**	1.524 <sup>ns</sup>	1.275 <sup>ns</sup>
<i>Marital status</i>				
Currently married (ref)				
Others	1.000	0.887 <sup>ns</sup>	1.000	1.00 <sup>ns</sup>
<i>Education</i>				
Primary (ref)				
Secondary	1.344**	1.264**	1.027 <sup>ns</sup>	1.317**
Higher Secondary	2.387***	1.797***	1.258*	1.051 <sup>ns</sup>
<i>Age at marriage</i>				
<18 (ref)				
18+	1.115 <sup>ns</sup>	0.874 <sup>ns</sup>	1.074 <sup>ns</sup>	.589***
<i>Age at first birth</i>				
<20 (ref)				
20+	0.828 <sup>ns</sup>	1.136 <sup>ns</sup>	0.797 <sup>ns</sup>	2.749***
<i>Birth order</i>				
1 (ref)				
2	0.883 <sup>ns</sup>	0.526***	1.765***	1.081 <sup>ns</sup>
3	0.458***	0.328***	2.626***	.763*
4+	0.448***	0.293***	2.524***	0.460***
<i>Sex of the child</i>				
Boy (ref)				
Girl	.994 <sup>ns</sup>	0.936 <sup>ns</sup>	0.651***	1.476***
<i># Source of Information about ANC/Institutional delivery/ family planning/ child immunization</i>				
Any mass media (ref)				
No mass media	.835 <sup>ns</sup>	0.815**	0.720***	1.081 <sup>ns</sup>
<i>Wealth quintiles</i>				
Poorest (ref)				
Poorer	1.488*	1.580***	1.542***	1.340**
Middle	2.368***	2.199***	1.716***	1.533**
Richer	2.006***	3.465***	2.553***	2.124***
Richest	3.906***	12.500***	2.986***	3.367***
<i>Regions</i>				
North east (ref)				
South	0.901 <sup>ns</sup>	1.421**	1.173 <sup>ns</sup>	1.439***
West	0.610**	1.103 <sup>ns</sup>	1.440***	6.625***
North	1.50**	1.300*	0.828 <sup>ns</sup>	1.367**
Central	1.252 <sup>ns</sup>	1.370**	1.498***	.842 <sup>ns</sup>
Constant	.055	.420	.256	.583

Note: Level of significance, \*p<0.10; \*\*p<0.05; \*\*\*p<0.01; ns- not significant; (ref) reference category, # OR value of source of information about ANC is related to Full ANC, OR value of institutional delivery is related to safe delivery, OR value of family planning is related to contraceptive utilization, OR value of child immunization is related to full child immunization.

Source: Authors' calculation from DLHS 3 unit level data

The wealth quintiles showed significant positive effect on utilization of full antenatal care among married women in Jharkhand. Women from richest wealth quintile were nearly four (OR=3.906) times more likely to utilize full antenatal care services than women from poorest wealth quintiles. Moreover, the odd of receiving full antenatal care among women who belong to poorer wealth quintile (OR=2.368) were higher than the women from poorest wealth quintile. Utilization of full antenatal care was found to be more likely in North regions in Jharkhand compared to North East regions. The results of the multivariate analysis for safe delivery care are presented in Table 5. Our findings show that place of residence, caste, religion, women's age group, women's education, birth order, mass media, wealth quintile and residence of regions were found to be statistically significant determinants in the utilization of the safe delivery. Women from urban area were more likely (OR=1.267) to utilize safe delivery compared to women from rural area. Similarly women from other caste showed odds of nearly two and half (OR=2.274) times more likely to use safe delivery services than SC women. Moreover, women from Muslim families were less likely (OR=0.722) to go for safe delivery services compared to Hindu women. Those women belonging to age group (35-49) were two (OR=2.100) times more likely to use safe delivery than women from age group (15-24). Women who had higher secondary education were nearly two (OR=1.797) time more likely to use safe delivery than women from primary educated. Moreover, odds ratio for women who had secondary education was (OR=1.264) more likely to get safe delivery than primary educated women. Women with more than one birth order were less likely to go for safe delivery care than women with one birth order. Similarly, women who had no source of information through any mass-media about safe delivery were less likely to go for safe delivery than women having information of institutional delivery through any type of mass media. Economic status of women was one of the highly significant determinants of utilization of safe delivery services.

Women who belong to richest wealth quintile were twelve and half (OR=12.500) times more likely to utilize safe delivery care compared to women of poorest wealth quintile. Moreover, odds ratio for women related to richer wealth quintile were three and half (OR=3.465) times more likely to get safe delivery care than poorest wealth quintile women. In addition, Women from north region of the state were more likely to use safe delivery than women from North East region. Western region women were less likely to go for safe delivery than North East women in the state of Jharkhand. Factors which determine use of contraception in Jharkhand include caste group, religion, age of women, their education level, birth order, sex of a child, mass media, wealth quintile and regions with high statistically significance level. Women belonging to ST caste were less likely to use contraception than SC women, moreover odds of other caste women were higher (OR=1.287) than SC women. Muslim women were less likely to use contraception than Hindu women. Middle age group (25-34) women were one and half (OR=1.569) times more likely to use contraception than women from low age group (15-24). High educated women were more likely to use contraception than primary educated women. Women belonging to two, three, and more than four birth order, odds

of contraception utilization were (OR=1.765, OR=2.626, OR=2.524 respectively) more likely compared to women related to first birth order. Women having girl child were less likely (OR=0.651) to use contraception than women who had a boy child. Those women having no mass media exposure, odds of contraceptive utilization were less (OR=0.720) than women having any type of mass media exposure. The economic status of the women was highly significant determinant in utilization of contraception in Jharkhand. Women from richest wealth quintile were nearly three (OR=2.986) time more likely to use contraception than poorest women. Regional variable do influence utilization of contraception among women in Jharkhand. Women from central and western regions were (OR= 1.498 OR=1.440respectively) more likely to use contraception than women from North Eastern region. The results of multivariate analysis for child immunization are presented in table 5. Our findings show that religion, women's education, age at the first birth, birth order, sex of the child, wealth quintile and regions were statistically significant determinants of the child immunization.

Odds of the Muslim children (OR=0.625) were lower than Hindu children. Similarly, children of women who had secondary education were more likely (OR=1.317) to be fully immunized than women having only primary education. Women whose age was more than 20 years at the time of first child birth, their children were three (OR=2.749) times more likely to use full immunization compared to women having age at first child less than 20 years. Those women having girl child show relatively higher odds of full child immunization than women having a boy child though, differences are minimal. Women's economic status is another important determinate of child immunization in Jharkhand. Women who belong to richest wealth quintile, children of them were more likely (OR=3.367) to be fully immunized than women from poorest wealth quintile. Further analysis reveal that children of women living in western region of the state were six and half (OR=6.625) times more likely to get full immunization than women belonging to North Eastern region. Similarly southern region show nearly one and half (OR=1.439) times more likelihood of full immunization among children compared to children from North Eastern region.

## DISCUSSION

High maternal and child mortality has become a characteristic of Jharkhand which also constitutes high percentage of SC/ST and poor population. Women in the state have a higher probability of bearing multiple burden of social exclusion, poverty and being a woman in patriarchal society. Considering poor conditions of women and children, this study assesses utilization of maternal and child health care services at regional (districts) level using variables of full antenatal care, safe delivery, contraceptive use and child immunization. It also examines inequalities in utilization and determinants of maternal and child health. For this purpose, data from District level household and facility survey 3 (2007-08) has been employed. This paper strongly recommends the results to government decision makers and policy planners to investigate the real loopholes in policies and programmes concerned and improve maternal and child health services at grass root level.

The finding of the study clearly identifies most backward regions of the state. Pakur, Godda, Sahibganj in north east part; west Singhbhum, Simdega and Seraikella in south western part and Latehar in western part of the state show worse conditions as far as composite index of maternal and child health service utilization is concerned. Besides, these regions also constitute high concentration of poor and SC/ST population. High underweight level is also rampant among the children of these regions. Further analysis of the data exhibits determinants of poor utilization of maternal and child health services in the state. Study based on Jharkhand shows that poor infrastructure, lack of quality care, corruption, behaviour of the health personnel, lack of information, difficult terrain, poor transport are the major factors for poor utilization of maternal health care (Rai *et al.*, 2014; Khan and Pradhan, 2013).

Our results show that economic status of women is one of the most important determinants of maternal and child health care use. Poor women are more vulnerable to access and utilize available health services than the rich women. Utilization of full antenatal care is one and half times higher among poor, two times among middle class and four times among the richest quintile with reference to poorest women. Similarly, immunization level of children is two times higher among richer and three times among richest group than the poorest category children. This finding is strongly supported by many other related literatures (Navaneetham and Dharmalingam, 2002; Filippi *et al.*, 2006; Sunil *et al.*, 2006; Pandey *et al.*, 2004; Pathak *et al.*, 2010). Economic freedom allows households to spend on their health as they do not have to cut short from their basic needs (Ray and Tulchinsky, 2012). Women's education is another important determinant of maternal health care utilization. Our results show that secondary pass women utilize 1.3 times more ANC, higher secondary pass use 2.3 times more ANC compared to primary pass women. Utilization of safe delivery services is also high among secondary and higher secondary pass women compared with primary pass women. Findings also show that in Jharkhand around 73 percent women got married before 18 years of age which shows a higher probability of dropping their schooling. In addition, around 70 percent women had their first child when they were just 20 years of age showing greater responsibilities of bringing up children and doing other household chores at very low age. This has resulted into avoidance or lack of awareness of the importance of health factor in life. Studies show that education builds up confidence among women to take decisions about their health, make women aware about the pros and cons of health services available in the market (Celik and Hotchkiss, 2000). Higher educated women can easily communicate with their husband and other family members about health related issues (Navaneetham and Dharmalingam, 2002). Educated women can also take care of health of their children as our result shows that children of secondary pass women get 1.3 times more full immunization cover than the primary pass mother's children. Caste differential also plays a major role in determining utilization of maternal and child health services after controlling other variables. However, caste variable is not significantly related in utilization of full antenatal care (same result also found in Singh *et al.*, 2012) and child immunization service need to be researched further and is beyond the scope

of this paper. Women belonging to ST category show lower odd ratio than the SC women but OBC and other category women utilize more contraception than the reference SC women. Jharkhand is considered a tribal state as a very high percentage of its population is tribal (26.2 percent according to 2011 Census estimates). Our results show that districts such as Simdega, Pakur and west Singhbhum have very high concentration of tribal population. These districts also show high rate of rural poverty. Low health, education and income status are the characteristics of tribes in Jharkhand (Singh *et al.*, 1999).

Utilization of maternal and child health services is lowest in these districts. A study conducted in Jharkhand state exhibits that maternal care utilization is very low among the tribal women than the non-tribal women (Maiti, 2005). Other studies also show that poor maternal care utilization, high anemia level and under-nutrition is common among the tribal women. Jharkhand is not the only state where poor utilization of maternal health services is common among ST/SC population but also this social exclusion is rampant throughout the country. Indian constitution has given equal right to all its citizens irrespective of their caste, class, community but caste hierarchy has deeply penetrated into Indian social structure. Women from lower caste are worst sufferers as being women belonging to *dalit* community; they have to live in abject impoverishment with exploitation. Kerala which is considered as most egalitarian society also show caste disparity in maternal care utilization (Mohindra *et al.*, 2006). Despite a low utilization of maternal services among all women in Uttar Pradesh, lower caste women show a higher probability of poor ANC, birth attendants, contraceptive use and tetanus toxoid services compared to other caste women (Saroha *et al.*, 2008). A comparative study of northern and southern states demonstrates poor utilization of ANC in northern than the southern states (Rani *et al.*, 2008). Caste in India has become a proxy for low socio-economic development which has rendered majority of Indian population backward and economically unproductive. Caste factor not only influences women but also to their children. Children belonging to lower caste have higher risk of death than the children of other caste group (Dommaraju *et al.*, 2008).

Other factors such as place of residence, religion, age of mother, birth order, exposure to mass media and region are important determinants of maternal and child health care utilization. Our results show that women with higher birth order utilize less safe delivery care than women with lower birth order. These findings are also supported by study done on newly born states (Pandey *et al.*, 2004). A possible explanation is provided by a study which states that higher birth order women could have gained confidence with high birth order and did not need to utilize modern health care services (Singh *et al.*, 2012). In addition, lower birth order women use less contraception than high birth order women which probably shows the preference of more number of children at lower birth order. Similarly, lower age women use less safe delivery care than higher age women. Thus, government reproductive and child health services should focus on high age and higher birth order women. Religious differentials in maternal and child health care utilization is also documented in several

studies however, multivariate analysis in present study shows only Muslim category as significant predictor variable with reference to Hindu category. Findings show that Muslim women have lower likelihood of utilizing safe delivery, contraceptive and child immunization than the Hindu women. Study shows that religion differentials could be due to some norms and values attached with the religious communities which make their attitude negative towards utilizing any health service (Gyimah *et al.*, 2006). Place of residence is another significant variable, though it is insignificant in case of child immunization and full ANC. Our study shows that only 14 percent of Jharkhand women live in urban areas but utilization of safe delivery care is 1.2 times more among them than their rural counterpart women which clearly shows poor plight of rural women. The gap in utilization of health services between rural and urban indicates political unwillingness, wrong policies and programmes as majority of Indian population reside in rural areas.

India being a large and diverse country exhibits greater regional disparities in terms of socio-economic development. Policy makers and planners must focus at regional perspective in order to attain overall development. However, results of the study does not clearly exhibit role of region in determining maternal and child health care utilization. Child immunization is comparatively higher in south, west and northern region than the north eastern region. Western region is insignificantly related to child immunization. Similarly, southern, northern and central region show higher probability of utilizing safe delivery care compared with north eastern region. In this case, western region is not significantly related to safe delivery care. These results could be explained with a prism of different level of socio-economic development. North eastern region covering Pakur, Sahibganj, Godda, Giridih and Deoghar districts exhibits high level of rural poverty. Role of mass media is another significant variable affecting utilization of maternal and child health care. Results show that safe delivery and contraceptive use increases with greater exposure to any type of mass media. However, ANC and child immunization are not significantly related with mass media exposure. A study conducted in Kolkata metropolitan area shows mass media has a positive bearing on health seeking behaviour (Partha *et al.*, 2002). Any type of mass media such as T.V., radio, newspaper keeps women aware about importance of health, available facilities at nearby health centers, government policies and programmes.

Sex of a child is another important determinant of health care utilization among women. In India, son preference is very strong part of social structure as sons are considered economic and social security at old age whereas girls are economic burden. In our study, mothers having a girl child use less contraception than the mothers having a baby boy which shows women want more children after having a girl child. On the other hand, women with a baby boy use contraception in order to prevent further pregnancy. However, child immunization is comparatively higher among girl children than their counterpart boys. These result need to be examined with other similar studies which has not been possible with the limited scope of this paper. In conclusion, findings of the paper clearly show that Jharkhand despite its rich mineral resources

and forest cover constitutes a very high percentage of poor population. Its majority of population is not educated and covers SC/ST population. Child under-nutrition level is also very high. Regional differentials show north eastern and southern region most backward in terms of socio-economic development and also in utilization of maternal and child health care services. Mothers education, birth order, wealth index are most important significant determinants in Jharkhand. Hence, planners and policy makers must focus on backward region and poor socio-economic groups in order to abridge inequalities prevailing among them.

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