

Factors influencing the consumption of iron and folic acid supplementations in high focus states of India



Ankita Chourasia^{a,*}, Chandra M. Pandey^b, Ashish Awasthi^c

^a Department of Biostatistics, Nayati Multi Super Speciality Hospital, Mathura UP 281003, India

^b Department of Biostatistics & Health Informatics, Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India

^c Department of Biostatistics, Nayati Multi Super Speciality Hospital, Mathura, UP, India

ARTICLE INFO

Article history:

Received 24 February 2017

Accepted 22 April 2017

Available online 6 May 2017

Keywords:

High focus states

IFA supplements

Maternal Health

SDG

NFHS

ABSTRACT

Problem considered: Iron deficiency during pregnancy is identified as a serious public health problem in most developing countries including India. In India, the majority of the pregnant women are anemic due to a variety of biological and socioeconomic reasons. The purpose of this study is to assess the factors influencing the consumption of Iron and Folic Acid (IFA) supplementation in high focus states of India.

Material and Methods: The present study is based on National Family Health Survey (NFHS-3, 2005-06) data. 11085 Recently delivered women. Variables named religion, place of residence, women's and education, birth order, wealth index, husband's education, husband's occupation, type of caste/tribe, and husband present during antenatal care (ANC) visit were taken as predictors. Women who received at least 90 IFA tablets were considered as outcome variable.

Results: Well educated women are four times more likely to adhere recommended dose of iron supplements (OR = 4.21; 95% CI = 3.30–5.36, $p < 0.01$). Women with birth order below 2 (OR = 2.33; 95% CI = 1.84–2.95, $p < 0.01$), women whose husbands are present during ANC visits (OR = 2.17; CI = 1.92–2.45, $p < 0.01$) and women with high socioeconomic status (OR = 2.12; 95% CI = 1.70–2.65, $p < 0.01$) are more likely to consume at least 90 days' iron supplement. Women who had any mass media exposure had 1.34 times (OR = 1.34; 95% CI = 1.13–1.58, $p < 0.01$) more chances to intake at least 90 IFA tablets.

Conclusions: Higher education and lower birth order infer to more iron consumption among pregnant women.

© 2017 INDIACLEN. Published by Elsevier, a division of RELX India, Pvt. Ltd. All rights reserved.

1. Introduction

India has missed the opportunity to achieve Millennium Development Goals 4 and 5.1 Global Burden of Disease report 2015 revealed healthcare scenario in India is not very impressive and India ranked 143rd out of 188 countries included in the study.2 There were approximately 0.28 million maternal deaths occurred worldwide in 2015, and one-fourth of those maternal deaths takes place in India.3 Although increased awareness and utilization of maternal health services reduced maternal mortality ratio of India almost half from 1990 (482.1 maternal deaths per 100,000 live births in 1990 to 248 maternal deaths in 2015) but still to achieve sustainable development goals 3 by the year 2030 a long way has to be covered. It has been reported in earlier studies that about 20% of

maternal deaths are directly related to anemia, and another 50% of maternal mortality are associated indirectly with anemia.4 Severely anemic mothers are more likely to give birth of a low weight baby due to intrauterine growth retardation (IUGR), which may result in neonatal mortality or many other long term health issues like cardiovascular diseases and cancer in neonates in a long time. It is also known that these IUGR babies are very high risk to various neurodevelopmental and psychiatric disorders in later stage of life.5,6

Iron deficiency during pregnancy is acknowledged as a serious public health problem around the globe. In low and middle-income countries, like India, pregnant women are most vulnerable part of society suffering from nutritional deficiencies to a significant degree due to long lasting gender inequality.7 The WHO estimates that 58% of the women in developing countries are anemic and in India status of women health is tragic and about 87% pregnant women are suffering from anemia regardless of their age and parity.8,9 Folate and iron deficiency during pregnancy are risk factors for anemia, leads to preterm delivery, low birth weight and poor neonatal health.10 To combat this threat, the composition of

* Corresponding author.

E-mail addresses: ankitasgpgi@gmail.com (A. Chourasia),

cmpandeylko@yahoo.com (C.M. Pandey), ashish.awasthi15@outlook.com (A. Awasthi).

Iron along with Folic acid in the form of tablets is prescribed to pregnant women which are helpful in increasing the hemoglobin concentration so that the level of anemia at term could be reduced. The provision of consumption of 100 iron and folic acid (IFA) tablets during pregnancy forms an essential component of the safe motherhood services offered as part of the Reproductive and Child Health Programme in India. In 2005–06 it was reported that only 23% women consumed iron tablets for at least 90 days during pregnancy.¹¹ Lack of iron consumption during pregnancy leads to exhaustion, improper work performance and diminution of the immune system as well as may affect newborn health. Iron is critical for early neuro-developmental processes of children and iron deficiency in mothers may trigger Autism Spectrum Disorder, spina-bifida and other neural tube defects.¹² Many studies related to iron supplementation in pregnancy have shown improved iron stores in the supplemented women compared with non-supplemented women.¹³ Thus appropriate iron supplementation is essential for maternal and newborn health, which in turn is influenced by several social and demographic factors. The present study is an attempt to determine the factors that affect the consumption of IFA supplementations in high focus states of India.

2. Methods

Data for the present study has been borrowed from the third phase of National Family Health Survey conducted during 2005–2006. The data is available in public domain through the webpage, <http://www.iipsindia.ac.in>, further data related queries may be addressed to email datacenter@iips.net. NFHS is a large scale, a multi-round sample survey of households throughout India.¹¹ 11085 recently delivered women from high focus states were included in the study. The Government of India (GOI) has prepared a list of eight states which are very poor in respect of demographic as well as the socio-economic indicators, and termed as high focus states. These states are Uttarakhand, Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan, Odisha, Jharkhand and Chhattisgarh. Consumption of at least 90 IFA tablets during pregnancy was considered as the dependent variable and recoded as a binary variable. The primary goal of antenatal care is to have a healthy child as well as healthy mother at the end of pregnancy. Basic components of Antenatal Care services include number of antenatal checkups, tetanus toxoid injections and IFA tablets. The Quality of ANC utilization is assessed by examining pregnant women and counseling them regarding their health during ANC visits. Variables such as religion, place of residence, women's age, education, working status, birth order, wealth index, exposure to mass media, household structure, type of caste/tribe and presence of husband during ANC visit were taken as possible determinants of IFA consumption and recoded into a categorical variable. Chi-square test was used to check the association between a dependent variable and potential determinants. Variables found significant in Chi-square test were included in the bivariate and multivariable analysis to determine the potential predictors of IFA consumption. All analyses were performed using SAS University Edition software. A p-value of less than 0.05 was considered as significant.

3. Results

The background characteristics associated with consumption of at least 90 IFA tablets are shown in Table 1. Chi-square test revealed a significant association between consumption of at least 90 IFA tablets with variables like age, religion, place of residence, type of caste/tribe, birth order, education status, wealth index, etc. Consumption of at least 90 IFA tablets in Muslim women (10.8%) was lesser than from women belonging to other religion (30.1%). There was rural-urban differential in the utilization of at

Table 1

Background characteristics of women who had consumed at least 90 IFA supplementations during pregnancy.

Variable	Characteristics	N = 11,085	n (%)
Age (in years)	15–19	930	126(13.5)
	20–24	3940	667(16.9)
	25–29	3579	723(20.2)
	>30	2636	416(15.8)
Religion	Hindu	9096	1662(18.3)
	Muslim	1707	185(10.8)
	Others	282	85(30.1)
Place of residence	Rural	7557	916(12.1)
	Urban	3528	1016(28.8)
Birth order	1–2	5612	1386(24.7)
	3–4	3188	406(12.7)
	≥5	2285	140(6.1)
	No education	6110	449(7.3)
Education	Primary	1465	227(15.5)
	Secondary	2764	796(28.8)
	Higher	746	460(61.7)
	Poorest	3317	292(8.8)
Wealth index	Poorer	2327	201(8.6)
	Middle	1840	238(12.9)
	Richer	1781	354(19.9)
	Richest	1820	847(46.5)
Type of caste/tribe	SC	2217	247(11.1)
	ST	1260	202(16.0)
	OBC	4979	697(14.0)
	None of them	2629	786(29.9)
Working status	Not working	8093	1530(18.9)
	Working	2992	402(13.4)
Husband present during ANC	No	6186	514(8.3)
	Yes	4899	1418(28.9)
Household structure	Nuclear	5434	800(14.7)
	Non-nuclear	5651	1132(20.0)
Mass media exposure	No exposure	3829	274(7.2)
	Any exposure	7256	1658(22.9)

All variables significant at $p < 0.01$ (Chi-square test)

least 90 IFA tablets, 12.1% women of rural areas and 28.8% urban women consumed at least 90 IFA tablets during pregnancy. IFA consumption significantly decreased with increasing birth order. IFA consumption was higher in women with birth order below three (24.7%) as compared to women with the higher birth order. IFA consumption also increased significantly with increase in the education status of women. Only 7.3% illiterate women consumed recommended IFA supplements in comparison to 50% women having higher education consumed at least 90 IFA tablets. Only 8.6% women belonging to poorest wealth quintile consumed IFA tablets while the adherence to recommended dose was found to be 46.5% among richest wealth quintile. IFA consumption was lowest among Scheduled Caste (11.1%) and highest among other categories (29.9%). Adherence to recommended dose of IFA consumption was higher among non-working women (18.9%). Participation of husband during ANC increased the IFA consumption. Recommended IFA consumption was higher among women living in a joint family (20.0%). Women who had any exposure to mass media consumed 17% of IFA than those who had no exposure of mass media.

Table 2 shows the results of bivariate and multivariable logistic regression analysis. All variable found significant in bivariate logistic regression analysis were included in the multivariable logistic regression analysis. Table 2 revealed that women's age, education, wealth index, birth order, type of caste/tribe, husband present during ANC visit, mass media exposure and religion are the significant predictors. Women with higher education were four times (AOR:4.21 95% CI = 3.30–5.36, $p < 0.01$), women with birth order 1–2 are more than two times (AOR:2.33 95% CI = 1.84–2.95, $p < 0.01$), women who belonged to richest wealth quintile were two times (AOR:2.12 95% CI = 1.70–2.65, $p < 0.01$), women who accompanied with husband during ANC visits were two times

Table 2
Multivariate logistic regression analysis presenting odds ratio and 95% CI.

Predictors	Characteristics	Unadjusted		Adjusted	
		OR	CI	OR	CI
Age (in years)	15–19 [®]				
	20–24	1.30	1.05–1.59	0.98	0.79–1.22
	25–29	1.61	1.31–1.98	1.26 [*]	1.00–1.60
	>30	1.19	0.96–1.48	1.53 [*]	1.17–2.00
Religion	Muslims [®]				
	Hindu	1.83	1.56–2.16	1.45 [*]	1.21–1.74
Place of residence	Others	3.55	2.63–4.77	1.84 [*]	1.29–2.62
	Rural [®]				
Birth order	Urban	2.93	2.65–3.24		
	5 + [®]				
Education	1–2	5.02	4.19–6.02	2.33 [*]	1.84–2.95
	3–4	2.23	1.83–2.73	1.58 [*]	1.26–1.97
	No education [®]				
Wealth index	Primary	2.31	1.94–2.74	1.65 [*]	1.37–1.99
	Secondary	5.10	4.49–5.78	2.27 [*]	1.92–2.68
	Higher	20.27	17.00–24.18	4.21 [*]	3.30–5.36
	Poorest [®]				
Type of caste/tribe	Poorer	0.97	0.81–1.18	0.81 ^{**}	0.66–0.99
	Middle	1.53	1.28–1.84	0.99	0.81–1.23
	Richer	2.57	2.17–3.03	1.25 [*]	1.02–1.55
	Richest	9.01	7.75–10.49	2.12 [*]	1.70–2.65
Working status	SC [®]				
	ST	1.52	1.24–1.86	0.75 [*]	0.62–0.90
	OBC	1.29	1.11–1.51	1.59 [*]	1.28–1.98
	Others	3.40	2.90–3.97	0.87	0.76–1.01
Husband present during ANC	Not working [®]				
	Working	0.66	0.59–0.75		
Household structure	Not present [®]				
	Present	4.49	4.02–5.01	2.17 [*]	1.92–2.45
Mass media exposure	Nuclear [®]				
	Non-nuclear	1.45	1.31–1.60		
Any exposure	No exposure [®]				
	Any exposure	3.84	3.35–4.39	1.34 [*]	1.13–1.58

[®] Reference category.

^{*} Significant at $p < 0.01$.

^{**} Significant at $p < 0.05$.

(AOR:2.17 95% CI = 1.92–2.45, $p < 0.01$), women of age more than 30 years had one and half times (AOR:1.53 95% CI = 1.17–2.01, $p < 0.01$), women belonging to Other Backward Caste were nearly two times (AOR:1.59 95% CI = 1.28–1.98, $p < 0.01$), women from other religions were about two times (AOR:1.84 95% CI = 1.29–2.62, $p < 0.01$), women who had any mass media exposure had about one and half times (AOR:1.34 95% CI = 1.13–1.58, $p < 0.01$) more chances to intake at least 90 IFA tablets in comparison to their counterparts who belongs to reference categories. Fig. 1 shows the adjusted odds ratio using multivariable logistic regression analysis. In logistic regression about 85% women were correctly classified when binary logistic regression was used.

4. Discussion

With the high prevalence of anemia in India, IFA supplement is must go for all pregnant women to improve their and newborn health. Although Government of India provides free IFA tablets for at least 90 days under various schemes, but unfortunately adherence to the recommended dose during pregnancy is poor especially in high focus states. This study focused on factors influencing the consumption of at least 90 IFA tablets during pregnancy in high focus states of India.

Findings revealed that women of age more than 25 years were more likely to consume at least 90 IFA tablets, same findings are observed in various studies in another setup.^{8,10,14,15} Education of women is a well-known factor influencing their autonomy as well as health seeking behavior.^{16,17} Women's education was positively associated with adherence to recommended dose of IFA

tablets. Women with a higher level of education tend to consume at least 90 IFA tablets during pregnancy as compared to uneducated women (OR = 4.2; 95% CI = 3.30–5.36, $p < 0.01$), same findings were reported by some other studies.^{13,18–20}

Inequality in the utilization of health care services is observed throughout the globe, and low and middle countries have more inequality regarding universal health coverage.^{21–24} The possibility of consumption of at least 90 IFA tablets increased significantly (OR = 2.1; 95% CI = 1.70–2.65, $p < 0.01$) with the wealth index, richest women consumed more tablets may be due to affordability of health services, and due to better education, similar results were reported in other studies.^{19,20,25}

Higher birth order is mostly belonging to women with less education and poor socio-economic status and it also inversely related to IFA consumption.¹⁰ Women of the higher birth order were less likely to follow the recommended dose of IFA (OR = 2.3, 95% CI = 1.84–2.95, $p < 0.01$) in comparison to women having up to two children, this pattern is visible throughout the globe.^{17,20,25}

Despite all efforts of almost 70 years of independence, cultural less advantaged group (SC, ST, OBC) are still lagging behind other categories regarding education, equal chances as well as health seeking behavior due to various socioeconomic and other reasons.^{5,19} In the present study, it was evident that women belonging to Other Backward Caste (OBC) were more likely to consume recommended iron tablets than those from Scheduled Caste (SC) (OR = 1.59; 95% CI = 1.28–1.98, $p < 0.01$).

From ages, India is a patriarchal society and still after almost 70 years of independence women are discouraged to go outside alone citing various reasons. Thus the presence of husband during ANC

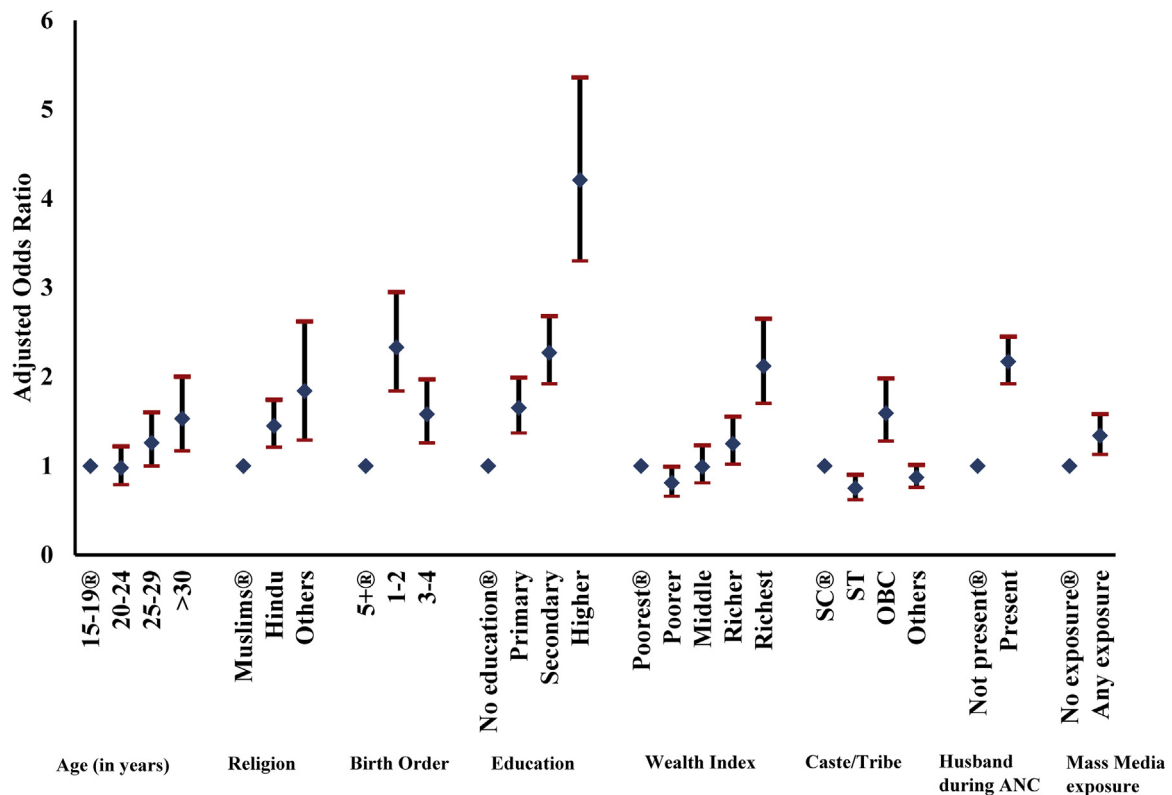


Fig. 1. Adjusted odds ratio for various predictors of IFA consumption.

visits encourage women to complete recommended at least three ANC visits during pregnancy. In this study, it was observed that husbands accompanying during ANC visits have twice impact on the pregnant wife to follow recommended dose of IFA (OR=2.1; 95% CI= 1.92–2.45, $p < 0.01$). This finding evoked that husband's knowledge regarding maternal health and their presence during ANC encouraged their wives to take recommended iron supplements.^{26,27}

Mass media exposure is a good source of information regarding health programs especially in India scenarios where women are discouraged to go outside alone. Women having mass media exposure have more chances to adhere to recommended dose of IFA in comparison of those who don't have mass media exposure (OR = 1.34; 95% CI = 1.13–1.58, $p < 0.01$), many studies reported that mass media campaigns helped educated as well as uneducated women in proper utilization of health care services.^{20,28}

It is well documented that women autonomy in Muslims is very poor due to various reasons like education, male dominant society, socioeconomic status, etc. We had found positive linkage between religion and IFA consumption. Likelihood of consuming at least 90 IFA supplements was almost twice among Hindu women and women from other religions in comparison to women belonging to Muslim community (OR = 1.8; 95% CI = 1.29–2.62, $p < 0.01$), some studies also pointed similar findings.²⁹

5. Conclusion

The findings of the present study reveal the possible predictors influencing the consumption of IFA supplementations during pregnancy in high focus states of India. Factors including maternal age, education, wealth index, birth order, type of caste/tribe, husband present during ANC visit, mass media exposure and religion were significantly associated with IFA supplementation.

Most of the women took IFA supplements before or during pregnancy, the overall percentage of use was still low. Low income, uneducated women with higher birth order and scheduled castes should be targeted to avail health care facilities provided by public and private service providers. There is an urgent need for separate policy and interventional programs planned for low performing states for the improvement of maternal health care services and make it available and affordable to all. This problem should be redressed by not only focusing on better consumption of IFA supplementations but also by improving the entire spectrum of maternal health. Programs covering the necessity of iron supplementations should be organized. Taking maternal health into consideration for the sake of the healthy life of both mother and child, IFA consumption probably remains the most important decider. The government of India should give more and more emphasis on these low performing states to overcome this serious health issue.

6. Limitations

The cross-sectional study design that was utilized is less powerful than any analytical design for evaluating risk factors. This study is based on the retrospectively collected secondary data, which may have introduced recall bias during data collection.

Conflict of interest

The authors have none to declare.

ACKNOWLEDGEMENTS

Author(s) would like to acknowledge Ms Niira Radia, Dr R.K. Mani, for their valuable suggestions and support.

References

- MOSPI. *Millennium development goals india country report 2014*. New Delhi: Ministry of Statistics and Programme Implementation; 2014.
- Lim SS, Allen K, Bhutta ZA, et al. Measuring the health-related Sustainable Development Goals in 188 countries: a baseline analysis from the Global Burden of Disease Study. *Lancet*. 2015;388(10053):1813–1850.
- Kassebaum NJ, Barber RM, Bhutta ZA, et al. Global, regional, and national levels of maternal mortality, 1990–2015: a systematic analysis for the Global Burden of Disease Study. *Lancet*. 2015;388(10053):1775–1812.
- Anand T, Rahi M, Sharma P, Ingle GK. Issues in prevention of iron deficiency anemia in India. *Nutrition*. 2014;30(7):764–770.
- Gogoi M, Prusty RK. Maternal anaemia, pregnancy complications and birth outcome: evidences from north-east India. *JN East India Stud*. 2013;3(1):74–85.
- Risnes KR, Vatten LJ, Baker JL, et al. Birthweight and mortality in adulthood: a systematic review and meta-analysis. *Int J Epidemiol*. 2011;40(3):647–661.
- Osmani S, Sen A. The hidden penalties of gender inequality: fetal origins of ill-health. *Econ Hum Biol*. 2003;1(1):105–121.
- Mithra P, Unnikrishnan B, Rekha T, et al. Compliance with iron-folic acid (IFA) therapy among pregnant women in an urban area of south India. *Afr Health Sci*. 2014;13(4):880–885.
- Kalaivani K. Prevalence & consequences of anaemia in pregnancy. *Indian J Med Res*. 2009;130(5):627–633.
- Ogundipe O, Hoyo C, Ostbye T, et al. Factors associated with prenatal folic acid and iron supplementation among 21,889 pregnant women in Northern Tanzania: a cross-sectional hospital-based study. *BMC Public Health*. 2012;12(1):481–490.
- International Institute for Population Sciences and Macro International. *National Family Health Survey (NFHS-3) 2005-06*. Mumbai, India : 2007.
- Schmidt RJ, Tancredi DJ, Krakowiak P, Hansen RL, Ozonoff S. Maternal intake of supplemental iron and risk of autism spectrum disorder. *Am J Epidemiol*. 2014;180(9):890–900.
- Knudsen VK, Hansen HS, Ovesen L, Mikkelsen TB, Olsen SF. Iron supplement use among Danish pregnant women. *Public Health Nutr*. 2007;10(10):1104–1110.
- Roy MP, Mohan U, Singh SK, Singh VK, Srivastava AK. Socio-economic determinants of adherence to iron and folic acid tablets among rural antenatal mothers in Lucknow, India. *Natl J Commun Med*. 2013;4(3):386–391.
- Nilsen RM, Vollset SE, Gjessing HK, Magnus P, Meltzer HM, Haugen M, et al. Patterns and predictors of folic acid supplement use among pregnant women: the Norwegian Mother and Child Cohort Study. *Am J Clin Nutr*. 2006;84(5):1134–1141.
- Awasthi A, Pandey CM, Singh U, Kumar S, Singh TB. Maternal determinants of immunization status of children aged 12–23 months in urban slums of Varanasi, India. *Clin Epidemiol Global Health*. 2015;3(3):110–116.
- Bhandari TR, Kutty VR, Ravindran TKS. Women's Autonomy and its correlates in Western Nepal: a demographic study. *PLoS One*. 2016;11(1):e0147473.
- R.K. Singh, S. Patra, Differentials in the Utilization of Antenatal Care Services in EAG states of India.
- Begum S. Factors associated with adherence to iron folic acid supplementations during pregnancy in Uttar Pradesh. *Indian J Mater Child Health*. 2012;14(2):2–9.
- Chimankar DA, Sahoo H. Factors influencing the utilization of maternal health care services in Uttarakhand. *Ethno Med*. 2011;5(3):209–216.
- Joe W, Mishra U, Navaneetham K. Health inequality in India: evidence from NFHS 3. *Econ Polit Weekly*. 2008;4:1–7.
- Awasthi A, Pandey CM, Chauhan RK, Singh U. Disparity in maternal, newborn and child health services in high focus states in India: a district-level cross-sectional analysis. *BMJ Open*. 2016;6(8):e009885–93.
- Mohanty SK, Dubey M, Parida JK. Economic well-being and spending behaviour of households in India: does remittances matter? *Migr Dev*. 2014;3(1):38–53.
- Dubey M, Ram U, Ram F. Threshold levels of infant and under-five mortality for crossover between life expectancies at ages zero, one and five in India: a decomposition analysis. *PLoS One*. 2015;10(12):e0143764–79.
- Mahapatro SR. Utilization of maternal and child health care services in India: does women's autonomy matter? *J Fam Welf*. 2012;58(1):22–33.
- Sinha KC. Male involvement and utilization of maternal health services in India. *Int J Sci Res Publ*. 2016;4(11):1–13.
- Kululanga LI, Sundby J, Malata A, Chirwa E. Male involvement in maternity health care in Malawi: original research article. *Afr J Reprod Health*. 2012;16(1):145–157.
- Mondal S. Utilization of antenatal care services in Rajasthan: observations from the NFHS. *J Fam Welf*. 1997;43(3):28–33.
- Raina S, Mengi V, Singh G. Differentials in iron folic acid supplementation among pregnant women in a rural area of North-West, India. *Int J Health Allied Sci*. 2013;2(1):9–12.