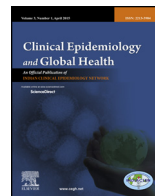




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Factors influencing the consumption of iron and folic acid supplementations in high focus states of India

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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.

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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

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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
Husband present during ANC	Working	2992	402(13.4)
	No	6186	514(8.3)
Household structure	Yes	4899	1418(28.9)
	Nuclear	5434	800(14.7)
Mass media exposure	Non-nuclear	5651	1132(20.0)
	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

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