

## Socio-demographic determinants associated with iron deficiency anemia in pregnancy in rural population of central India

Amardeep Tembhare\*, Shila Shelke, Poonam Varma Shivkumar and Surekha Tayade

Department of Obstetrics and Gynecology, Mahatma Gandhi Institute of Medical Sciences (MGIMS), Sevagram, Wardha, Maharashtra, India

### \*Correspondence Info:

Dr. Amardeep Tembhare,  
Department of Obstetrics and Gynecology,  
Mahatma Gandhi Institute of Medical Sciences,  
Sevagram, Wardha, Maharashtra, India. Pin-442102  
E-mail: [sbamardeep@mgims.ac.in](mailto:sbamardeep@mgims.ac.in)

### Abstract

Worldwide Iron deficiency anemia (IDA) affects 25% of the population and in India it affects 80% of pregnant women. A prospective observational study was conducted to know the relationship between IDA and socio-demographic determinants in pregnancy. Pregnant women with singleton pregnancy with gestational age more than 20 weeks and IDA (Hb <10 gm %) were selected and studied for socio-economic and demographic parameters. 15.02% rural women had severe anemia IDA as compare to women who did not show IDA. 60% anemic women belonged to the age group of 20-25 years and 20% illiterate women had severe anemia. Multigravida women were at more risk for IDA of which 13.84% were severely anemic out of whom 65% were vegetarian. 19% were married before age of 20 years of which 26.31% had severe IDA. This study emphasize that demographic parameters have a major role to play in development of IDA and that improvement in socioeconomic condition, educational status and living conditions can prevent IDA.

**Keywords:** Anemia, Pregnancy, Multigravida women.

### 1. Introduction

Iron deficiency is a most common nutritional deficiency worldwide, both in developed and developing countries [1] affecting approximately 25% of the world's population and is the most common cause of anemia. [2][3] A crude estimate is that 500 million women between 15-49 years of age worldwide are anemic [4]. In India IDA prevalence ranges from 33-89% [5] and it affects 80% of the pregnant women. Prevalence of IDA in first trimester of pregnancy ranges from 3.5% to 7.4% and increases to 15.6 to 55% in third trimester [6]. Considering the burden of IDA on pregnant women following study was undertaken to know the magnitude of IDA in pregnancy and its possible association with various social, economic and demographic factors.

### 2. Material and methods

A prospective observational study was carried out at Kasturba hospital Sevagram a tertiary care rural hospital in central India over the period of two years from January 2012 to December 2013. Pregnant women with singleton pregnancy with gestational age > 20 weeks and IDA (Hb <10 gm %) who visited to outpatient department (OPD) of Obstetrics and Gynaecology were selected. Informed written consent from mothers was taken. Women having other type

of anemias were excluded from the study. Diagnosis of IDA was done by hemoglobin estimation and further confirmed by serum ferritin level. Women were evaluated for various socio-economic and demographic determinants as a cause of IDA in pregnancy. Statistical analysis was done using Epi 6 software. P value < 0.5 was taken as statistically significant.

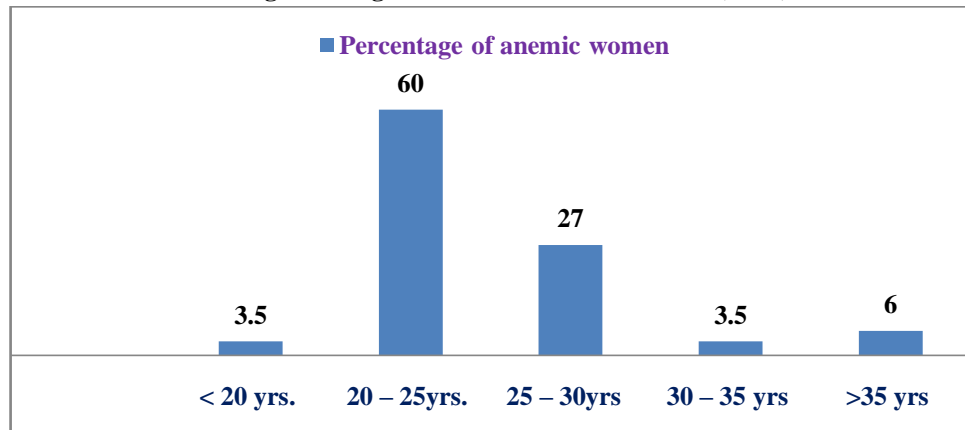
### 3. Observations and Results

Initially 241 women were registered in the study out of which 193 (80.08%) came for follow up. Remaining women were given phone calls, letters and home visits (who stay nearby) to come for follow up. 7 women reported for follow up with personal efforts. Hemoglobin and serum estimation was done for diagnosing and confirmation of IDA. Following sociodemographic determinants were studied.

#### 3.1 Age

120 (60%) women belonged to age group of 20-25 years, 27% belonged to 25-30 years of age and 12 (6%) were from age > 35 years of age. 3.5% women were of age < 20 years. Current profile indicated that most of anemic women 174 (87%) were belonged to age group between 20-30 years. Median age of 25 years with maximum numbers of study subjects (87%) were between 20-30 years. (Figure 1)

Figure 1: Age distribution of IDA women (in %)

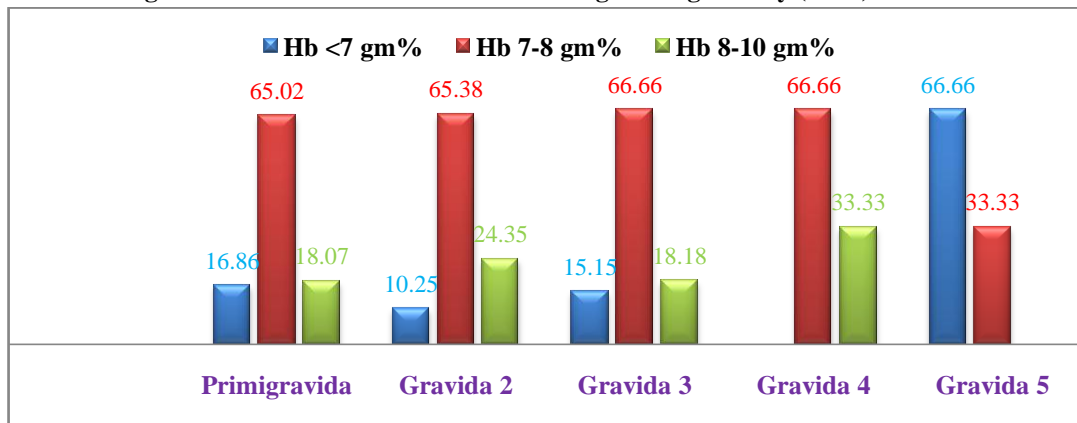


**3.2 Gravidity**

83 women (41.5%) in this study were primigravida amongst whom 14 (16.86%) women had Hb <7gm%, 54 (65.02%) had Hb 7-8 gm% and 15 (18.07%) had Hb of 8-10gm%. Trend of increasing severity of IDA with gravidity was observed in our study. Women who were gravida 3

(15.15%) had severe anemia and of gravidity 5 (66.66%) were severely anemic. Though women with higher gravidity studied were less in numbers, severity of anemia was more in them when compared with women of lower gravidity. (Figure 2)

Figure 2: Distribution of anemia according to the gravidity (in %)

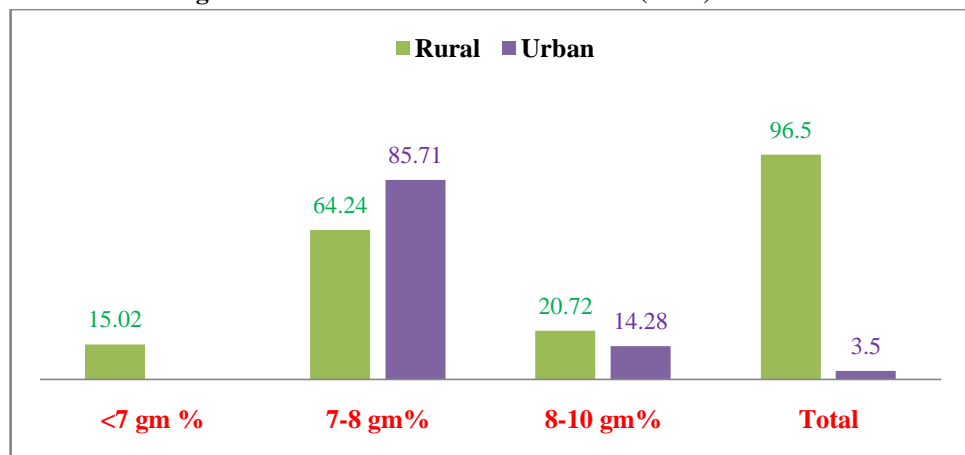


**3.3 Area of Residence**

96.5% of pregnant women belonged to rural area and (7) 3.5% belonged to urban area. Of these 7 women of urban area none were severely anemic. In rural group 193

women (96.5%) were anemic out of which 29 women (15.02%) had Hb less than 7 gm %, 124 women (64.24%) had Hb 7-8 gm% and only 40 (20.72%) had Hb 8-10 gm % as shown in figure 3.

Figure 3: Anemia in rural/urban women (in %)

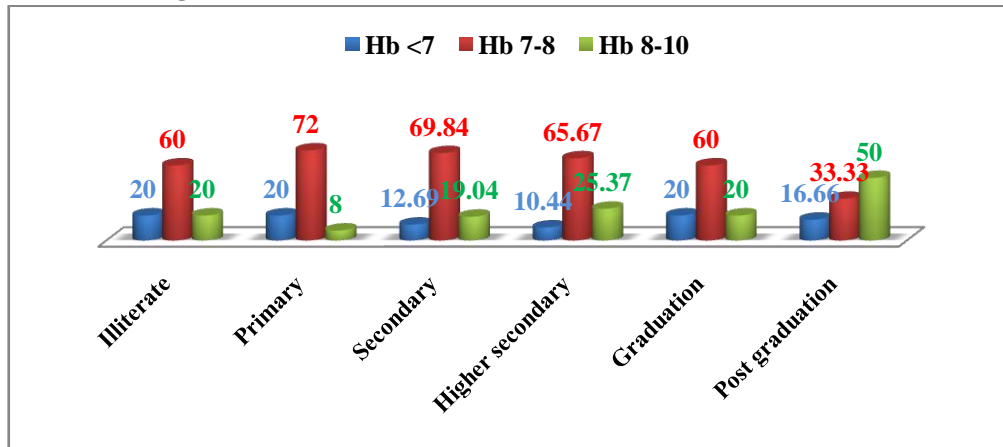


**3.4 Educational levels**

33.5% anemic women were educated up to higher secondary and 44% of anemic women were educated till secondary school. Of 5(2.5%) illiterate women 20% had severe IDA and 60% had Hb between 7-8 gm%. Anemia was

less prevalent in postgraduate women 5(2.5%) as compared to graduate pregnant women 35 (17.5%). Thus our study indicates education plays a major role in amelioration of anemia. (Figure 4)

**Figure 4: Relation of anemia with the levels of education (in %)**

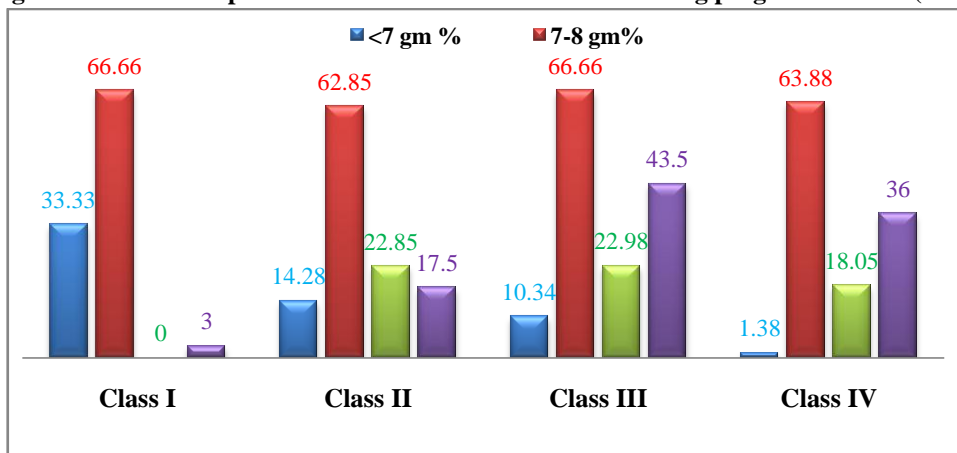


**3.5 Socioeconomic Status**

Majority of pregnant anemic women belonged to socioeconomic classes III and IV. 87 women (43.50%) were from socioeconomic class III, out of which 9 women (10.34%) were severely anemic. 58 women (66.66%) had Hb

levels between 7-8 gm %. 72 (36%) women from class IV were anemic, out of which 47 (65.26 %) had Hb less than 8 gm%. Class I and II had only 20.50% of anemic women. Hence it is clear that socioeconomic status plays a major causative role in IDA. (Figure 5)

**Figure 5: Relationship of Socioeconomic status and IDA among pregnant women (in %)**



**\*Note:-**Distribution of Socioeconomic Status. **Class I:** - Per capita income >2000 per month. **Class II:** - Per capita income 1200-2000 per month. **Class III:-**Per capita income 500-1200 per month. **Class IV:** - Per capita income <500 per month.

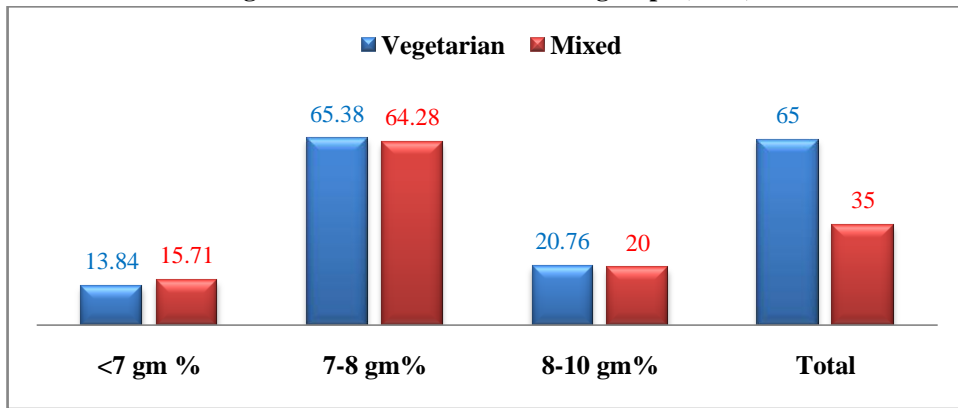
Socioeconomic status does have a negative impact on nutrition and hence it has a positive association with IDA and it has been proved by many other studies [7][8]. In our study mean study population from class I were 3%, class II were 17.50%, class III were 43.50% and class IV were 36%. 79.50% of pregnant women in our study were from lower socioeconomic status. In our study prevalence of IDA was significantly higher in lower socioeconomic class (p<0.05).

**3.6 Dietary Habits**

130 (65%) pregnant anemic women takes only vegetarian diet in our study indicating diet is an important

factor for anemia (mean 43±36.36) as compared to 35% (23±18.82) who consumes mixed diet which is statistically significant (p<0.05). Out of these 130 women, 18 (13.84%) had Hb<7 gm%, 85 (65.38%) had Hb levels between 7-8 gm% and 27 (20.76%) had Hb levels between 8-10 gm %. In mixed diet group, 64.28% pregnant women had moderate anemia. However none of anemic women were purely nonvegetarian reflecting intake of diet with less protein content in anemic women and prevailing sociocultural milieu of the society. (Figure 6)

**Figure 6: Anemia in various diet groups (in %)**

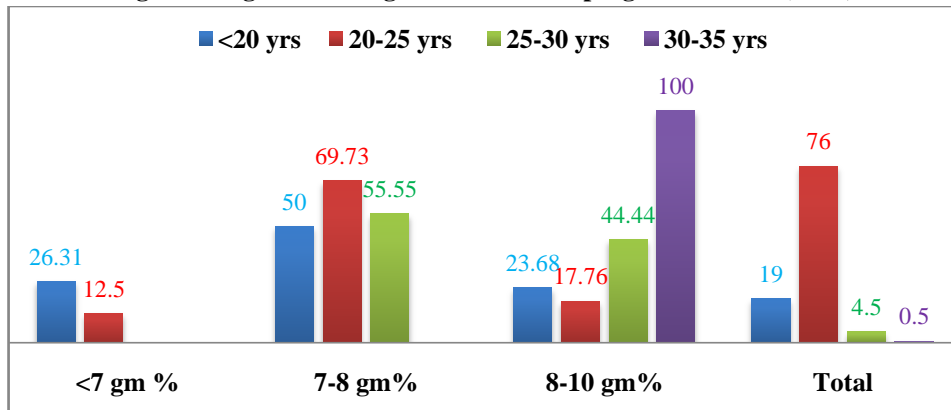


**3.7 Age of marriage**

38 pregnant women (19%) were married before the age of 20 years. Of these 38 women, 19(50%) had Hb 7-8 gm% and 10 (26.31%) had Hb < 7 gm%. Majority of women were married between age of 20-25 years i.e. 152 (76%) of

which 19 (12.50%) were having Hb <7gm% and 106 (69.73%) had Hb 7-8 gm %. Thus a higher percentage of women who married before the age of 20 years were severely anemic as compared to other women who married after 20 years of age. (Figure 7)

**Figure 7: Age of marriage and anemia in pregnant women (in %)**

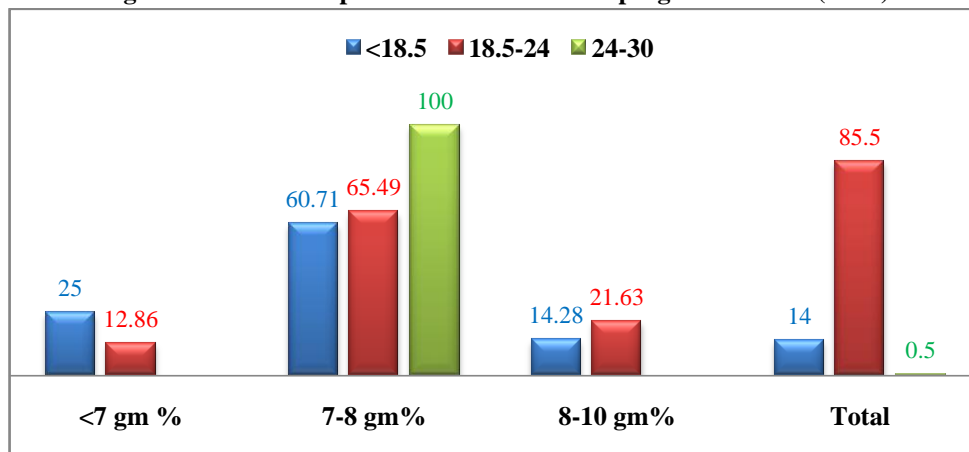


While studying relation of age at marriage with anemia, 19% of pregnant women got married before age of 20 years. 152 women (76%) married between age of 20-25 years (mean 50.66 SD 40.08) of which 12.50% had Hb levels <7 gm%. however, severe anemia was more prevalent (26.31%) in women who got married before age of 20 years as compared to 12.50% in women who married after 20 years of age.

**3.8 Body Mass Index (BMI):**

171 (85.5%) anemic women had BMI between 18.5-24 kg/m<sup>2</sup> amongst whom 22 (12.86%) had Hb <7 gm% and 111 women (65.49%) had Hb 7-8 gm %. Of 28 women with BMI <18.5 kg/m<sup>2</sup>, seven (25%) women were severely anemic thus indicating women with less BMI are more prone for IDA. (Figure 8)

**Figure 8: Relationship of BMI and anemia in pregnant women (in %)**



#### 4. Discussion

Women's reproductive health is an indicator of nation's health. Many times women's health depends on various socioeconomic and demographic factors. IDA during pregnancy can be a great health indicator of women's reproductive health and can be used as a tool to improve women's health during pregnancy.

While reviewing relationship of age with IDA few investigators did not found any significant relationship [9][10] but among these Peterson and colleagues found significance of age in studied population [11] where mean age of anemic women was 25.8±5.6 years (p value 0.017). Pregnant women less than 20 years of age were 3.5% in our study. When we compared our teenage pregnant population with other study, figures were much less compared to other rural study population in which 22.9% women were having age less than 20 with mean Hb levels less than 8gm%. This study also gave an idea that most common age group prone for anemia is between 20-30 years which is the reproductive age group in many countries.

Looker observed prevalence of IDA was 7% among adolescent and adult women aged 12-49 years and is serious United States (US) public health problem, affecting up to 16% of pregnant women between 12-49 years of age [12]. Another data [13] U.S. indicates that overall prevalence of IDA is highest in pregnant women between age group of 20-49 years [14]. Chaudhary and colleagues [15] from India found that 35.1% adolescent girls were anemic. Many other studies from India also found similar prevalence [16] with higher prevalence noted in Tamil Nadu [17][18][19].

Primigravida constituted 41.4% (mean 27.66±22.81) of study population in our study among whom 16.86% women were severely anaemic confirming trend of increasing severity of IDA with gravidity which was also confirmed by Looker *et al* [20]. In primigravida only 16.86% women were severely anaemic but in gravida 5 or more 66.66% had severe anemia and these study findings were consistent with many other studies.[21][22] However incidence of grandmultipara is significantly decreased in our area because of health and family life education.

Prevalence of IDA in pregnant women was found to be 49.7% in Ghana [23] whereas in our study IDA in rural pregnant women is 96.5. In Andhra Pradesh, India overall 32.4% of women had mild (100-109.99 g/l for pregnant women, 100-119.99 for non-pregnant women), 14.19% had moderate (70-99.99 g/l) and 2.2% had severe anemia (<70 g/l) and significant number of anemic pregnant women were from rural area [24].

In many studies it had been found that low educational standards contribute to higher prevalence of IDA [25][26][27]. Less than 12 years of education imposes 2-fold or more risk for anemia [28]. In our study we observed 31.50% and 33.50% of women who were anemic were educated up to secondary and higher secondary levels

respectively. Women who completed graduation and post graduation were also anemic (17.50% and 2.50% respectively). 20% of pregnant women who had completed graduation had severe anemia and 16.66% pregnant women who completed post graduation had severe anemia. While studying IDA in adolescent girls in Asian subcontinent significant association between anemia and levels of education was found.[29][30]

Negative impact of low socioeconomic status on IDA in pregnancy was studied by many researchers [31][32]. Studies in Pakistan found positive relationship of IDA with poor socioeconomic status [33][34] and this was consistent with earlier study in the same population.[35] IDA is 96.5% prevalent among non school going adolescent girls in Orissa, of which, 45.2%, 46.9%, and 4.4% had mild, moderate and severe anemia repetitively and significant association between anemia and their family income and socioeconomic status was found [36].

40% of vegetarian women were found anemic in age group of 19-50 years [37]. Majority of anemic women consume diet poor in nutritive value [38]. To support this low intake of meat, fish and poultry or iron fortified foods is a risk factor for IDA as observed by many others.[39][40][41]

#### 5. Conclusion

After completion of this study we found that to prevent IDA in pregnant women social policies and political strategies to eradicate IDA should be considered. Locally available and affordable rich dietary iron sources should be made available to pregnant women as a part of nutritional programmes. Oral iron supplementation programme also need to be re-evaluated as after many years of this programme with extensive coverage IDA still killing our mothers. The compliance to oral therapy should be checked and alternative to oral therapy approach should be considered in special and severe cases. Also in socioeconomically sound settings poor knowledge regarding diet and nutrition is responsible for anemia in women. [42] Many health policies which are addressed towards health of pregnant women should be so comprehensive that they should include socioeconomical strategies and their effective implementation at each level of society.

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