

# A Statistical Evaluation of Anaemic Patients of Rajasthan

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## Abstract

Anaemia is a condition where the number of red blood cells or the capacity of carrying oxygen is not sufficient to meet physiologic needs, which can vary by sex, smoking, drinking and eating habits, altitude, age and pregnancy status. The most common cause of anaemia is the deficiency of Iron. In this study, we used the data from NFHS-4 and studied the independence of gender of anaemic people with respect to different age groups of Rajasthan. Suitable statistical tools are used to test the independence of gender of anaemic people with respect to age groups.

**Keywords:** Age, Anaemia, Chi-square test, Gender, NFHS, WHO

## Introduction

Anaemia is defined as the decrease in haemoglobin in the blood or the total amount of red blood cells (RBCs) or decreased ability of the blood to carry out oxygen (Bansal *et al.*, 2013). The main cause of anaemia around the world is lack of dietary iron in the diet which are required to make red blood cells (World Health Organization 2019).

In India prevalence of Anaemia is the highest in the world. Its existence is high among preschool children and pregnant woman (Unnikrishnan and Charan, 2017). According to Indian Council of Medical Research (ICMR) anaemia affects an estimated 50% of the population India (Onyeneho *et al.*, 2019). Around 55% of women and 70% of children and adolescent in India suffer from anaemia. UNICEF in 2015 reported that 56% of female adolescents had anaemia in India (Pattnaik *et al.* 2013). The presence of Anaemia prevalence has reduced to a very low extent from past last years, as per the reports of NFHS-3 and NFHS-4 data showing decrease of Anaemia in women from 55 % to 53% and decrease of anaemia in males from 24% to 23% (Al-alimi *et al.*, 2018).

The study concludes that prevalence of anaemia was higher than 48.4% and it was also observed that there is high prevalence of anaemia in pregnant females (Rawat *et al.*, 2016). They concluded that overall prevalence of anaemia was 83.6%. The presence of anaemia in girls at the age of 10 years is higher than that of boys. It has been concluded that the occurrence rate of anaemia is high for the children of tribal community having poor hygiene and low socio-economic status (Mandot and Bamnawat, 2015). It was observed that there is a highly significant difference in the BMI for vegetarian and non-vegetarian group. The mean haemoglobin level was of non-vegetarian was

higher than the vegetarian group. It was also observed that for non-vegetarian group consumption of fat, energy, protein and iron was high (Mahajani and Bhatnagar, 2015). They observed that women facing the problem of uterine myoma and over the age of 35 are at a higher risk of anaemia. It was also observed that women aged 35 and over who were overweight had a lower risk of anaemia than women with normal weights. In both age groups, those who drank alcohol habitually were at a lower risk than those who did not (Hisa *et al.*, 2019).

## Objective and Hypothesis

This study aims to check the following hypotheses:

- a) To check whether there is an association among gender and age of anaemic people with reference to Rajasthan.

H1: There is no association among age and gender of anaemic people.

- b) To check whether there is an association among gender and residence of anaemic people with reference to Rajasthan.

H2: There is no association among residence and gender of anaemic people.

- c) To test whether there is an association among education level and gender of anaemic people with reference to Rajasthan.

H3: There is no association among education level and gender of anaemic people.

## Material and Methods

In this study secondary data from NFHS-4 (2015-2016) (National Family Health Survey) has been used.

The National Family Health Survey of 2015-16 (NFHS-4) provides state wise information population, health, and nutrition (Table 1, 2 and 3).

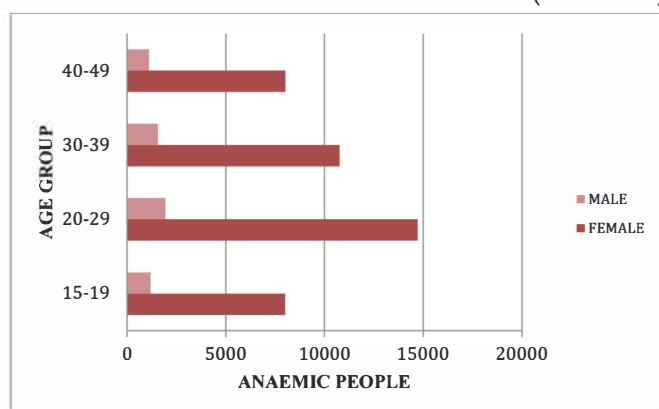
Data of Anaemic patients were taken with several factors like age distribution, residence, education level.

In graphical representation bar graphs have been used to show the data. (Fig.1)

**Table 1. Age-wise distribution of Anaemic Patients in Rajasthan**

Age	Female	Male
15-19	8,002	1,185
20-29	14,715	1,933
30-39	10,755	1,555
40-49	8,011	1,109

Source: NFHS-4 (2015-2016)



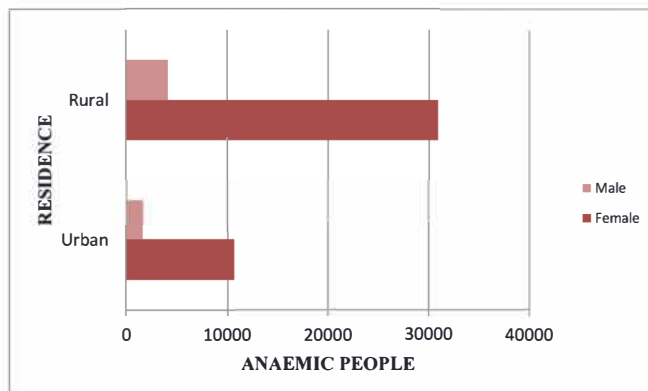
**Fig. 1. Age wise distribution of Anaemic People (NFHS-4) in Rajasthan**

It can be analysed from the graphs that the people in age group 15-19 are less anaemic as compared to the age group 20-29 especially in females. It may be due to marriages, pregnancy, etc. As the age group increases the rate of anaemia in people decreases.

**Table 2. Residence of Anaemic Patients in Rajasthan**

Residence	Female	Male
Urban	10,633	1,636
Rural	30,850	4,146

Source: NFHS 4 (2015-16)



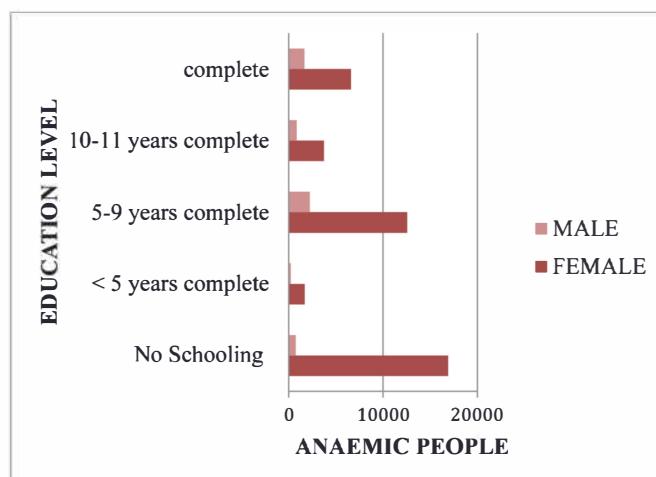
**Fig. 2. Residence of Anaemic People (NFHS - 4) in rural and urban Rajasthan**

It can be observed from fig. 2 that the residents of rural areas, mainly women are mostly affected to anaemia as compared to the urban areas. This may be due to many reasons including lack of education, sanitation, and malnutrition, lack of awareness about the schemes launched by government, early marriages and pregnancy.

**Table 3. Education level of Anaemic Patients in Rajasthan**

Level of Schooling	Female	Male
No Schooling	16,880	759
< 5 years complete	1,693	227
5-9 years complete	12,551	2,264
10-11 years complete	3,738	863
Complete	6,621	1,669

Source: NFHS 4 (2015-2016)



**Fig. 3. Education level of Anemic People (NFHS-4) of Rajasthan**

It can be analysed with the fig. 3 that people with no schooling are highly affected with anaemia and as the education level increases the rate of anaemic people starts declining.

### Chi-Square Test

Chi square test of Independence of Attributes: - A chi-square  $\chi^2$  test statistics is used to check whether there is association between the variables in the study. The data gathered for the purpose of calculating a chi-square test must be raw, random, selected from independent variables, mutually exclusive and should be selected from a large sample. In this study, this test will be applied to the anaemic patients with different factors like age, residence, education level for males and females. A contingency table has been formed which shows the frequency distribution of the variables. It gives us a general idea of the interrelation among two or more variables.

Then row total of all rows and column total of all columns and one grand total are calculated. The expected values for each observed value is given by the formula:

$$E_i = (\text{row total} \times \text{column total}) / \text{overall total}$$

Now after finding all expected values we will apply chi square test of attributes by using the formula

$$\sum((O_i - E_i)^2 \div E_i)$$

Here  $O_i$  = observed values and  $E_i$  = expected values

Test criteria: - Comparison between calculated value and the tabulated value for the statistics at some predefined level of significance and for given degrees of freedom is done. If chi square calculated  $\chi^2$  < chi square tabulated with  $(r-1) \times (c-1)$  degree of freedom at 5% level of significance then we don't reject null hypothesis (Gupta and Kapoor 1970).

p-value :- In statistics, p-value is another major criterion to test the hypothesis of the study. The p-value gives us the extreme level that can be observed for a hypothesis test if the null hypothesis is true. The small p-value of the test statistics point towards the acceptance of alternative hypothesis and rejection of null hypothesis.

### Results and Discussion

From all the calculations it is observed that the p value for age wise distribution for anaemic patients is 0.00864 at 3 degree of freedom and 5% level of significance (Table 1). It means there is an association between age wise distributions of anaemic patients with reference to Rajasthan. From all the calculations it is observed that the p value for Residence for Anaemic patients is 0.000015159 at 1 degree of freedom and 5% level of

significance (Table 2). It means there is an association among residence of anaemic patients with reference to Rajasthan. From all the calculations it is observed that the p value for education level for anaemic patients is 0 at 4 degree of freedom and 5% level of significance. It means there is an association among education level of anaemic patients with reference to Rajasthan.

### Conclusion

It is concluded from our results that the prevalence of anaemia in adolescent age is quite high and as the age increases the anaemic rate get decreases. Also, it had been seen that the anaemic rate is much higher in rural areas as compared to urban areas. Anaemia is a public health issue globally, that affects developing as well as developed countries in their economic and social development. Prevalence of anaemia is highest in India and this rate is more for pregnant women and preschool children. So, proper measures should be taken to reduce this rate.

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