

Assessment of Prevalence of Anemia and Associated Factors Among Women of Reproductive Age in Rajasthan

By

Priyanka Sharma

*Dissertation submitted in partial fulfillment of the requirements of the degree
MBA Hospital and Health Management*

Academic year, 2018-2020



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TO WHOMSOEVER MAY CONCERN

This is to certify that Dr. Priyanka Sharma, student of MBA Hospital and Health Management from The IIHMR University, Jaipur has undergone internship training at National Health Mission, Rajasthan from 11/03/2020 to 10/06/2020.

The Candidate has successfully carried out the study designated to him during internship training and his approach to the study has been sincere, scientific and analytical. The Internship is in fulfilment of the course requirements.

I wish him all success in all his future endeavours.

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In recognition of having successfully completed her
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National Health Mission, Rajasthan

and has successfully completed her Project on

**Assessment of prevalence of anaemia and associated factors among women
of reproductive age in Rajasthan**

Date : 11th March to 10th June, 2020

She comes across as a committed, sincere & diligent person who has a strong drive and zeal
for learning.

We wish her all the best for future endeavors.

**Special Secretary
Medical, Health & Family Welfare
Mission Director, NHM
Rajasthan**

THE IIHMR UNIVERSITY, JAIPUR

CERTIFICATE BY SCHOLAR

This is to certify that the dissertation titled “**Assessment of prevalence of anaemia and associated factors among women of reproductive age in Rajasthan**” submitted by **Dr. Priyanka Sharma** (Enrolment No. IIHMR-U/01/2018-20/0806) under the supervision of **Dr. Arindam Das** for award of MBA in Hospital and Health Management of the University carried out during the period from 11/3/2020 to 10/6/2020 embodies my original work and has not formed the basis for the award of any degree, diploma associate ship, fellowship, titles in this or any other institute or other similar institution of higher learning.



Signature

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I, hereby, take this opportunity to express my gratitude to the people who have been instrumental in the successful completion of this project. The successful completion of this project is only because of extraordinary support, guidance, counselling and motivation from staff of, IIHMR University and my organization National Health Mission, Rajasthan.

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LIST OF ABBREVIATIONS

NFHS-National Family Health Survey

WHO- World Health Organization

RBCs- Red Blood Cells

IDA-Iron Deficiency Anaemia

PSUs-Primary Sampling Units

BMI-Body Mass Index

IFA- Iron and Folic Acid

CI- Confidence Interval

ABSTRACT

Introduction: Anaemia continues to be a major public health problem worldwide, particularly among low and middle income countries. In Rajasthan, 47 percent of women of reproductive age group are anaemic.

Objectives: The objective of this study is to identify the districts of Rajasthan with higher prevalence of anaemia and to determine the plausible social, economic, demographic and health factors leading anaemia.

Methods: Study population was consisted of 41,965 women of reproductive age group (15-49 years) from the state of Rajasthan taken from NFHS-4 dataset. Binary logistic regression was used to identify the factors leading anaemia.

Results: The mean haemoglobin concentration of women of reproductive age group in Rajasthan, India is found to be 122.89 g/l. The overall prevalence of anaemia among women of age group (15-49 years) in Rajasthan is 47.8 percent with the highest prevalence in Banswara (75.7%), Durgapur (73%), Udaipur (69.5%), Baran (65.4%) and Bundi (63.6%) districts.

Conclusion: Anaemia was found to be a significant problem in women of reproductive age in Rajasthan. Women with BMI<18.5, low education, more number of children, lower wealth index were at high risk of anaemia.

INTRODUCTION

Anaemia is decreased number of RBCs or decreased haemoglobin concentration within these cells. Due to decreased haemoglobin concentration in anaemia there is lowered blood capacity in carrying oxygen to the tissues which can result in decreased oxygen flow to the organs. In order to meet physiological needs, the required haemoglobin concentration depends on age, sex, elevation of residence, habits such as smoking and current pregnancy¹. Iron deficiency is the leading cause of anaemia and results in about half of all anemia cases worldwide, when iron deficiency is severe, the haemoglobin concentration in the blood decreases, leading to IDA, which have negative health effects, especially in children, adolescents and pregnant women². Other causes of anaemia includes deficiency of vitamin A and B12, folic acid, haemorrhage, parasitic infections like malaria and hookworms causing helminthic infestations and other worms, inherited conditions such as sickle cell disease and thalassaemia and chronic disease like renal failure, cancer etc³

The high-risk population groups for anaemia are: children below 5 years of age, particularly those who are below 2 years of age, adolescents, pregnant women and women aged 15–49 years⁴

Global scenario:

According to the recent estimates of 2016, 33 percent of women aged 15-49 years are anaemic which around 613 million women is in reproductive age group worldwide. The highest prevalence of anaemia is in Africa and Asia, which is over 35 percent. Severe anaemia affects 0.8-1.5 percent of the same population group which can result in mortality and poor cognitive as well as functional outcomes. WHO South-east Asia Region had highest residents of women and children having anaemia which includes non-pregnant women (190 million), pregnant women (11.5 million) and children under 5 years of age (96.7 million)⁴.

Scenario in India:

According to NFHS-4, out of 699,686 women (15-49 years), 53 percent are anaemic which includes 40 percent of women having mild anaemia, 12 percent having moderate anaemia and one percent having severe anaemia. Out of 112,122 men (15-54 years), 23 percent are anaemic which includes 12 percent with mild anaemia, 10 percent with moderate anaemia and one percent with severe anaemia.

In Rajasthan, out of 41,965 women (15-49 years), 47 percent of women are anaemic, which are further classified, 35 percent as having mild anaemia, 11 percent as having moderate anaemia, and one percent as having severe anaemia.

Anaemia is an important public health issue in Rajasthan, particularly in women and children⁵.

In women, anaemia can result in weakness, decreased learning ability and concentration, reduced physical capacity and productivity, increased morbidity due to infectious diseases, increased risk of maternal as well as perinatal deaths, preterm delivery, low weight at birth, insufficient iron stores for new-born.

In children, deficiency of iron has negative effects on motor and cognitive development as well as on scholastic achievement³.

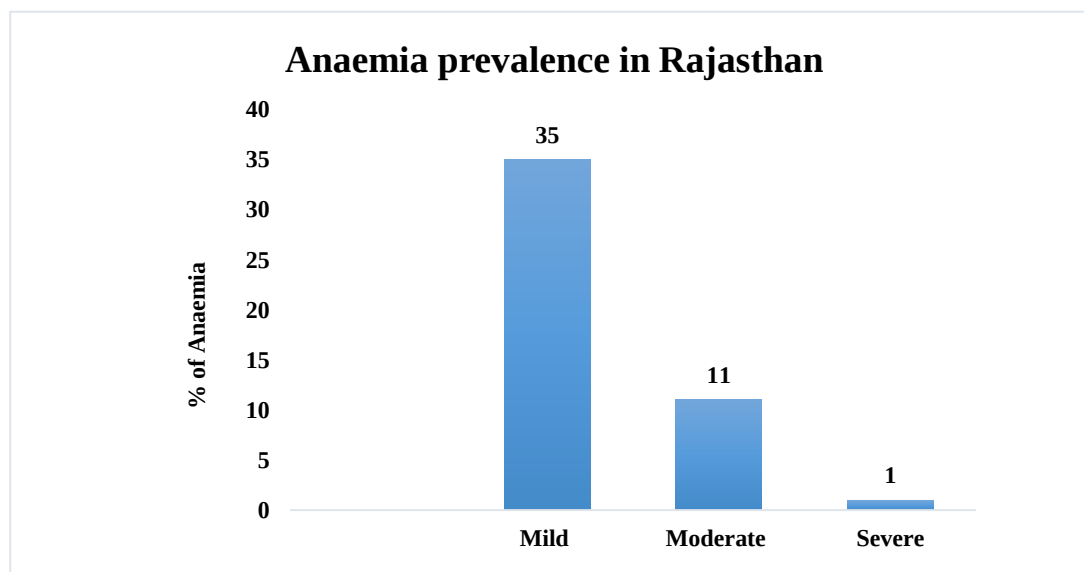


Fig 1.1: Anaemia prevalence among women of Rajasthan

Anaemia in adolescents and women of reproductive age:

Due to various causes, there are higher chances to develop nutritional deficiencies especially iron deficiency which leads to anaemia among this group. One of them is blood loss at regular intervals during menstrual cycle that increases iron loss from the body thereby increasing its requirement. During adolescence and pregnancy there is significant increase in requirements of iron due to high growth and development during these periods as their iron store serves their increasing blood volume as well as it is a source of haemoglobin for growing foetus. Significant iron loss can also occur due to massive bleeding during childbirth, and food with low bioavailability of iron and due to intestinal disorder which can affect absorption of iron in bloodstream are common among adolescents and women in many developing countries⁵.

Table 1.1: WHO Recommendations for Haemoglobin concentration at sea level for anaemia diagnosis (in g/l) ¹

Anaemia				
Population group	No Anaemia	Mild	Moderate	Severe
For non-pregnant women of age 15 years or above	120 or more	110 to 119	80 to 109	less than 80
For pregnant women	110 or more	100 to 109	70 to 99	less than 70

Haemoglobin concentrations increased due to residential elevation and habit of smoking. Therefore, the measured haemoglobin levels are adjusted for persons living at higher altitudes (1000 metres above sea level) and for smokers.

Rationale

Anaemia continues to be a problem of great public health significance globally, especially in developing countries setting. In Rajasthan, as stated earlier, 47 percent of women aged 15-49 years are anaemic. This study aims at identifying the districts of Rajasthan with higher prevalence rates of anaemia as well as in determining plausible social, economic, demographic and health factors leading anaemia. Thus this will help to choose the high risk population groups and related factors to improve the implementation of appropriate control measures for reducing the problem of anaemia.

Aim

To assess the prevalence rates and social, economic, demographic and health factors leading anaemia among women of reproductive age in Rajasthan.

Objective

To determine the prevalence and factors leading anaemia among women of reproductive age group in Rajasthan by using NFHS-4 dataset.

Specific objectives:

1. To show the prevalence of anaemia in various districts of Rajasthan.
2. To determine some common factors leading anaemia
3. To examine the strength of association of anaemia with the identified factors.

LITERATURE REVIEW

One of the study titled “Lifestyle behaviour affecting prevalence of anaemia among women in EAG states” (2013) by RK Singh revealed “the higher prevalence rates of anaemia among all women. Women aged 15-19 years, having no or lower education, poorest , more than 3 children, habit of smoking and chewing tobacco, not consuming fruits and pulses are more prone to be anaemic, it shows that lifestyle variables have a vital role in causing anaemia in non-pregnant women of reproductive age groups”. Therefore, a short and effective program is required to reduce the variations in socioeconomic and lifestyle factors, which influences the anaemia level as well as the health of women, to control the high prevalence rates of anaemia in EAG states.

A study on Burden of anaemia in women of India (2003) showed “the higher prevalence of anaemia among all women. The prevalence of anaemia is less in Muslim women, consuming alcohol or pulses, and high income women in urban areas. Highest rates and odds of being anaemic was present in poor urban women. Overweight women are less likely to be anaemic as compared to normal-weight and underweight women, it was observed that the high prevalence of anaemia was present among all BMI groups.” It implies that the programs are required across socio-economic groups and in both rural as well as urban areas, but particularly among the urban and rural poor to improve overall nutritional status of women of reproductive age group.

A cross sectional study on prevalence of anaemia and correlated Factors in the Reproductive Age women in Rural Areas of Tabas(2013) by Majid Sadeghian and others showed that the higher prevalence of anaemia was observed in women of with low socio economic status and high parity index (with more than two pregnancies). Women of age group 40-44 years were at higher risk of being anaemia. Age is related differently to anaemia for different regions.

A study titled Prevalence of anaemia in Reproductive age in Meghalaya (2010) by Sanku Dey and others revealed that “49.6% of women were found to be anaemic. High risk of anaemia was found in pregnant, under nutritious and poorest women.. Prevalence among women was higher in urban areas. The habit of smoking cigarette/pan/bidi/gutka etc. also increases the risk of anaemia. It implies the need for

well-planned, large-scale studies using standardised methods considering background characteristics, to estimate the prevalence of anaemia and other micronutrient deficiencies among women of reproductive age group.”

A study on Prevalence of Anaemia and its determinants among Non-Pregnant and Pregnant women of India (2008) by Premananda Bharti and others showed “that non-pregnant women aged less than 25 years are most affected by anaemia. The severity of anaemia is higher among pregnant than non-pregnant women. Women’s education and standard of living in the households play a significant role in reducing anaemia. Urban and well-nourished women also suffer less from anaemia. Efforts must be made to educate women and enhance their level of economic status, so that the prevalence of anaemia can be reduced substantially.”

A study titled Determining factors for the prevalence of anaemia in women of reproductive age in Nepal: Evidence from recent national survey data (2019) found that “about 41% of the women of reproductive age were anaemic. Thus, anaemia could be considered as a major public health problem. The higher prevalence of anaemia revealed in this study compared to the past survey highlights the needs to reconsider the existing nutritional policy in Nepal. The higher prevalence was observed in underweight women as compared to obese women. Both, anaemia and lower BMI are the indicators of poor nutritional status. Poor diet quality may result in the lower bioavailability of dietary iron, thus increasing the risk. Surveillance and interventions programs for anaemia are required for targeted groups and high-risk populations for reducing of anaemia.” Further research studies are recommended to understand the prevalence and determinants of anaemia.

METHODOLOGY

Research Question:

Is prevalence of anaemia associated with social, economic, demographic and health factors among women of reproductive age in Rajasthan?

Study Design and setting:

The National family Health Survey 2015-16 (NFHS-4) provides a cross-sectional dataset on women's body weight, haemoglobin level, and other important socio-demographic factors. Secondary analysis using existing data was conducted for the state of Rajasthan, India.

Study population:

41,965 women of reproductive age group (15-49 years), taken from NFHS-4 dataset from the state of Rajasthan used for this study.

Sampling Method:

In NFHS-4, sample was a stratified two-stage sample. The survey was conducted in both urban as well as rural areas. PSUs were selected, villages for rural areas and Census Enumeration Blocks, CEBs for urban areas, using census 2011 as the sampling frame. From sampling frame, villages were selected using Probability Proportional to Size (PPS), within each rural stratum.

In second stage, using systematic sampling method, 22 households were randomly selected from every selected urban and rural cluster. NFHS-4 interviewed every alternate household, in 30 percent of the selected clusters, for achieving a sample representative of 15 percent of households. In NFHS-4, out of 28,586 clusters which were selected across the country, fieldwork was carried out in 28,522 clusters⁵

ETHICAL CONSIDERATIONS

As secondary data from NFHS 4 was used for this study, no separate ethical clearance was obtained.

ANALYSIS AND RESULTS

Table 5.1: Prevalence of anaemia among various districts of Rajasthan

Districts	Non-anaemia(21892) 52.2%	Anaemia(20073) 47.8%	Total 41965
Banswara	267	833(75.7%)	1100
Dungarpur	294	793(73%)	1087
Udaipur	302	688(69.5%)	990
Baran	406	767(65.4%)	1173
Bundi	359	626(63.6%)	985
Pratapgarh	397	666(62.7%)	1063
Tonk	409	675(62.3%)	1084
Rajsamand	413	647(61%)	1060
Kota	843	1313(60.9%)	2156
Sirohi	406	590(59.2%)	996
Jhalawar	429	609(58.7%)	1038
Jalor	468	654(58.3%)	1122
Chittaurgarh	366	506(58%)	872
Bhilwara	445	566(56%)	1011
Ajmer	1127	1208(51.7%)	2335
Pali	545	516(48.6%)	1061
Dhaulpur	616	526(46.1%)	1142
Jodhpur	1287	978(43.2%)	2265
Bikaner	1414	1042(42.4%)	2456
Barmer	563	400(41.5%)	963
Alwar	662	451(40.5%)	1113
Bharatpur	645	432(40.1%)	1077
Jhunjhunu	762	472(38.2%)	1234
Nagaur	727	440(37.7%)	1167
Karauli	686	414(37.6%)	1100
Sawai Madhopur	696	419(37.6%)	1115
Ganganagar	799	426(34.8%)	1225

Hanumangarh	743	379(33.8%)	1122
Churu	758	386(33.7%)	1144
Jaisalmer	681	336(33%)	1017
Sikar	861	400(31.7%)	1167
Jaipur	1710	624(26.7%)	2334
Dausa	806	291(26.5%)	1097

This table shows the prevalence of anaemia among women of reproductive age in various districts of Rajasthan. Top 5 districts showing highest prevalence rates include Banswara (75%), Dungarpur (73%), Udaipur (69.5%), Baran (65.4%) and Bundi (63.6%).

Factors leading higher prevalence of anaemia among women of reproductive age in the districts:

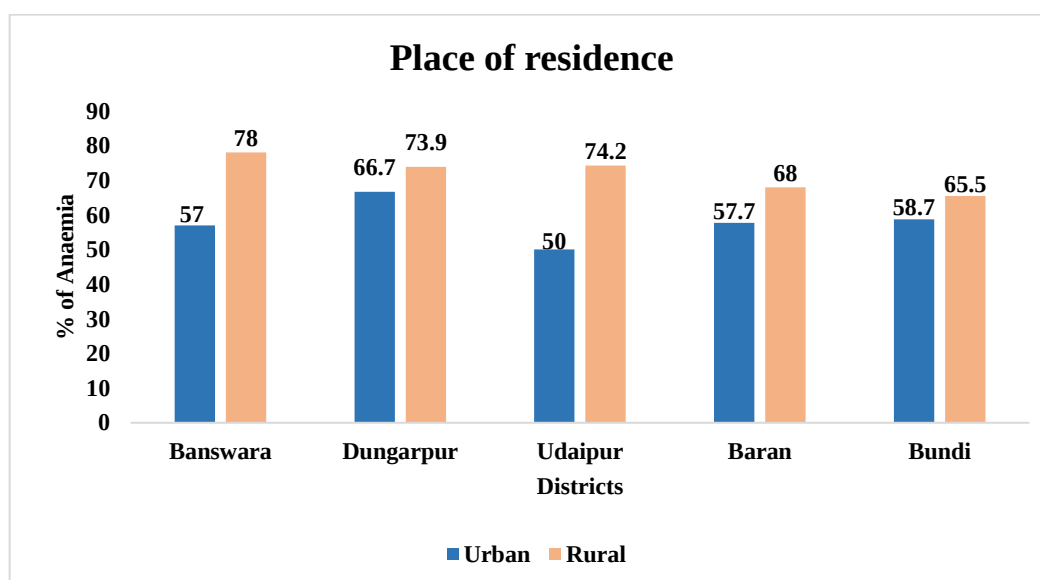


Fig 5.1: Place of residence of women in various districts

This graph shows that the prevalence of anaemia is higher among women residing in rural areas than among women residing in urban areas in all the districts.

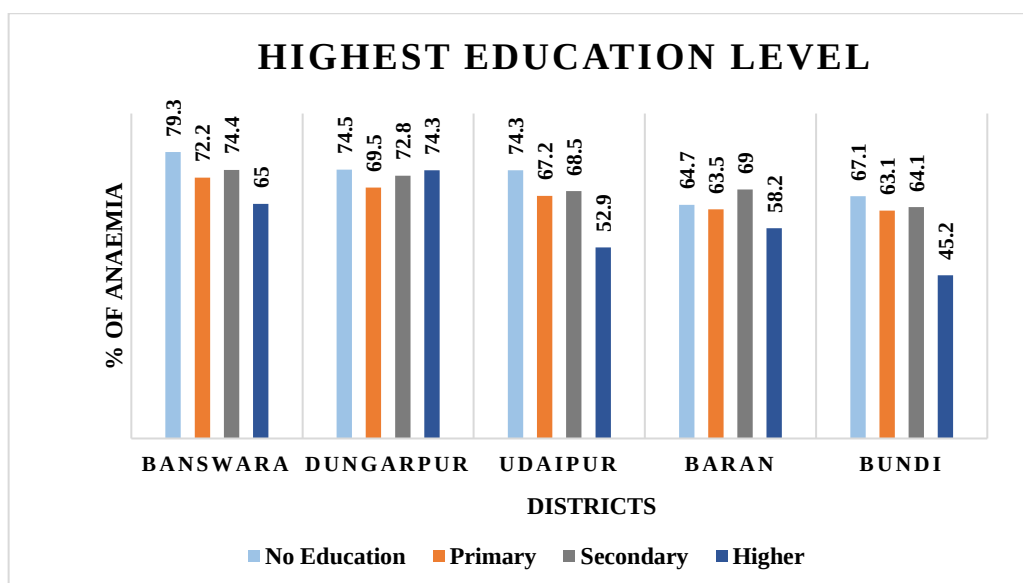


Fig 5.2: Highest education level of women in various districts

This graph shows higher prevalence rates of anaemia among women having no, primary and secondary education in comparison to women having higher education in all the districts.

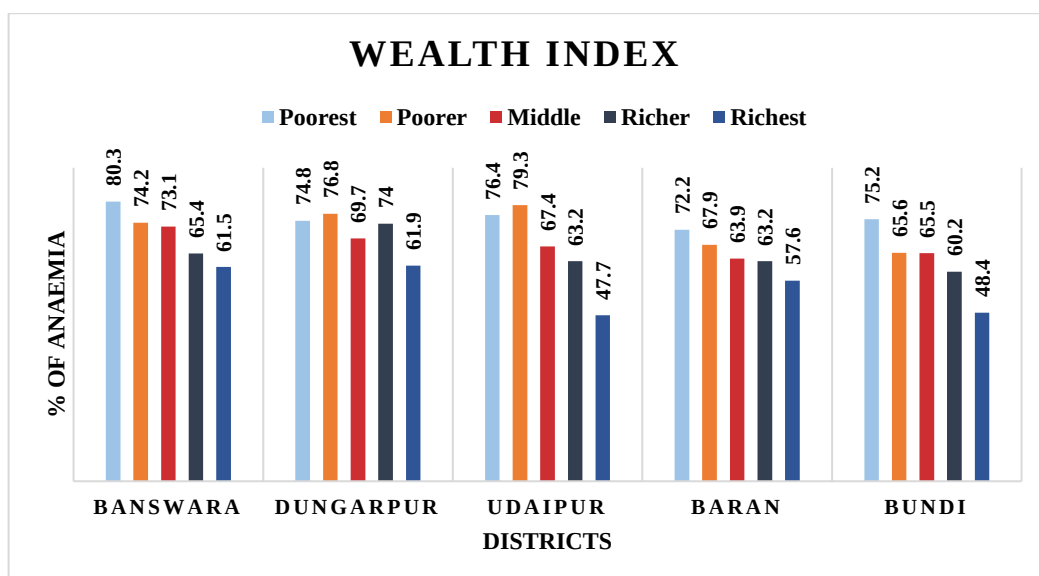


Fig 5.3: Wealth Index of women in various districts

This graph shows higher prevalence rates of anaemia in poorer women in comparison to richer women in all the districts. This indicates that higher wealth index reduces the risk of anaemia in women.

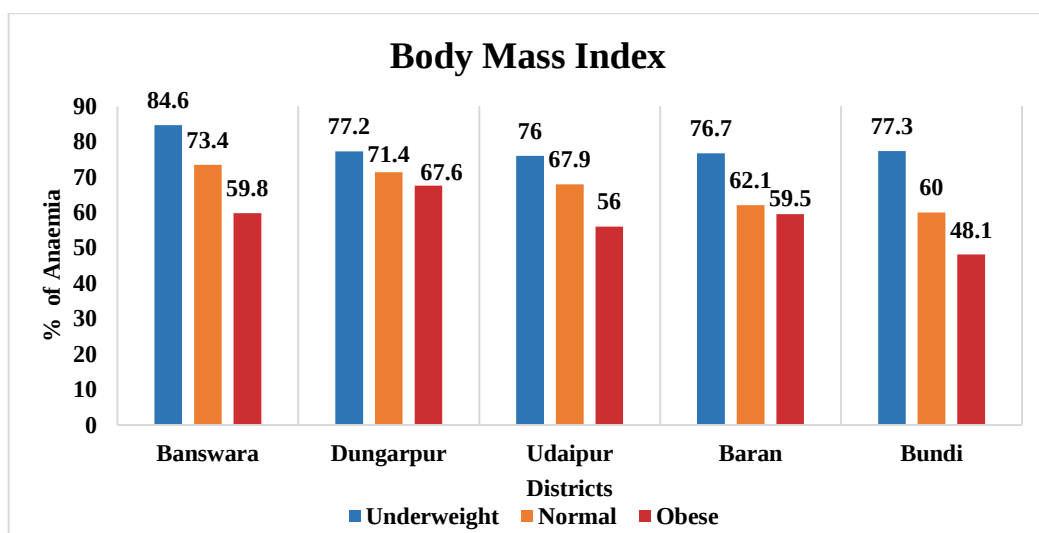


Fig 5.4: Body Mass Index of women in various districts

This graph shows that the prevalence of anaemia is higher in underweight women in comparison to normal and obese women in all the districts. This indicates that BMI<18.5 increases the risk of developing anaemia in women of reproductive age.

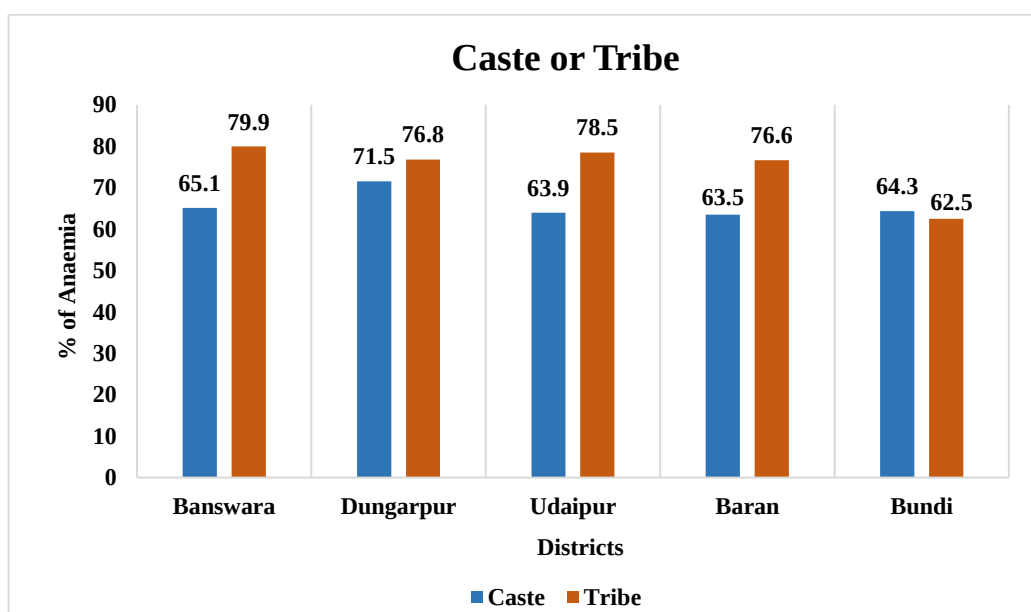


Fig 5.5: Caste or tribe of women in various districts

This graph shows higher prevalence rates of anaemia among scheduled tribe women in comparison with scheduled caste women in all the districts. This shows the higher risk of developing anaemia among tribal women.

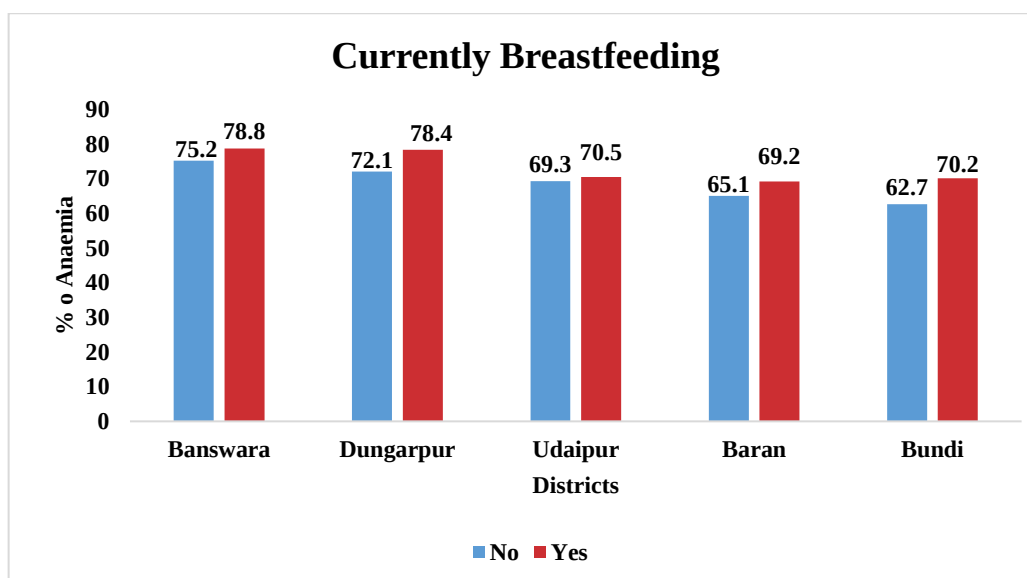


Fig 5.6: Currently Breastfeeding women in various districts

This graph shows higher prevalence rates of anaemia among scheduled tribe women in comparison with scheduled caste women in all the districts. This shows the higher risk of developing anaemia among tribal women.

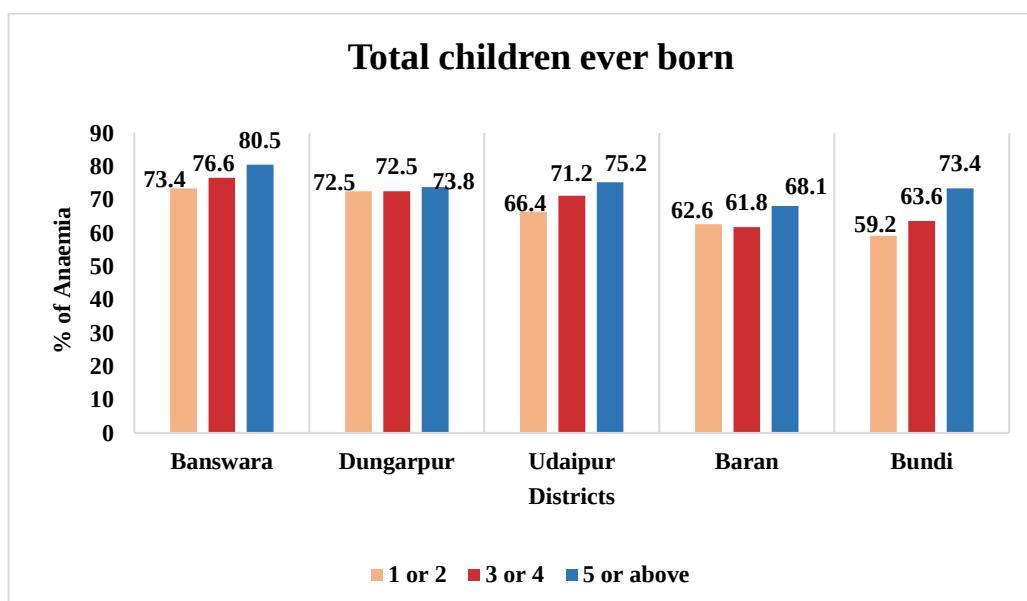


Fig 5.7: Total children ever born

This graph shows higher prevalence of anaemia in women having 5 or more children as compared to women having 1 or 2 children. Increasing parity is associated with increase in the prevalence of anaemia.

Factors leading anaemia in Rajasthan:

Data analysis was carried out with the help of Statistical Packages for Social Sciences (SPSS). Binary logistic regression analysis was used to determine the factors leading anaemia. Results of logistic regression was provided in the form of Odds Ratio with corresponding 95% C.I. to show the strength of association.

A variable with p value<0.05 was considered statistically significant. The first category was taken as the reference group for all the variables.

Dependent variable:

The main outcome variable was Anaemia level. It was created as dichotomous variable:

0=Non anaemia

1=Anaemic (mild, moderate, and severe)

Independent variable:

The socio-demographic, reproductive and nutritional covariates included in the analysis were age groups, place of residence, Educational status, Wealth, Currently pregnant, Respondent's occupation(Grouped),BMI, Total children ever born based on review of the existing literature.

The logistic regression model:

$\pi_i = \Pr(Y_i=1|X_i=x_i) = \frac{\exp(\beta_0 + \beta_1 x_i)}{1 + \exp(\beta_0 + \beta_1 x_i)}$: Anaemia level(0=Non anaemic, 1=Anaemic).

The results are shown in the following table:

.

Table 5.2: logistic regression analysis of anaemia on predictor variables

Variables	P-value	Odd's Ratio	95% C.I. for Odd's Ratio	
			Lower	Upper
Age group (15-19)	.373			
20-24	.659	1.043	.865	1.257
25-29	.378	.902	.715	1.139
30-34	.465	.910	.707	1.172
35-39	.098	.799	.613	1.042
40-44	.400	.887	.670	1.174
45-49	.679	.941	.704	1.257
Place of residence (urban)				
Rural	.640	.969	.850	1.105
Educational status(Uneducated)	.017			
Primary education	.045	1.178	1.003	1.382
Secondary education	.057	1.155	.996	1.339
Higher education	.465	.921	.737	1.149
Wealth (Poorest)	.000			
Poorer	.005	.788	.667	.932
Middle	.000	.585	.491	.696
Richer	.000	.613	.509	.738
Richest	.000	.504	.408	.622
Currently Pregnant (No/Unsure)				
Yes	.294	.881	.694	1.117
Respondent's Occupation				
(No occupation)	.212			
Technical/managerial	.242	1.271	.851	1.898
Clerical	.850	1.159	.251	5.350
Sales	.350	1.294	.753	2.224
Agricultural	.709	.974	.847	1.120
Domestic	.663	1.095	.728	1.648
Manual	.076	1.203	.981	1.475

Don't know	.046	1.918	1.011	3.639
BMI(Underweight)	.000			
Normal	.000	.732	.651	.824
Pre-obese	.000	.613	.506	.742
Obese	.000	.367	.279	.483
Total children ever born(0)	.081			
1-2	.499	1.064	.889	1.274
3-4	.092	1.205	.970	1.496
5 or more	.023	1.359	1.043	1.770
Constant	.000	1.786		

DISCUSSION

Anaemia continues to be a problem of great public health significance in women of India, throughout the lifespan. The mean haemoglobin concentration for women of 15-49 years of age in Rajasthan is 122.89 g/l with Standard deviation 68.41g/l. Results of the study shows that the factors leading anaemia such as Highest Educational level, BMI, Wealth Index, Total children ever born are statistically significant (Table5.2). It was found that women having no education, primary education and secondary education women are at greater risk than women having higher education with Odds ratio of 1.178, 1.155 and 0.921 respectively. Wealth index shows that the anaemia prevalence is higher in poorer women than in richer women. The prevalence of anaemia was higher in underweight women in comparison to normal and obese women. Women having more number of children are at higher risk with Odds ratio of 1.359. The factors such as age group, type of place of residence, pregnancy status and occupation has not been found to be significant.

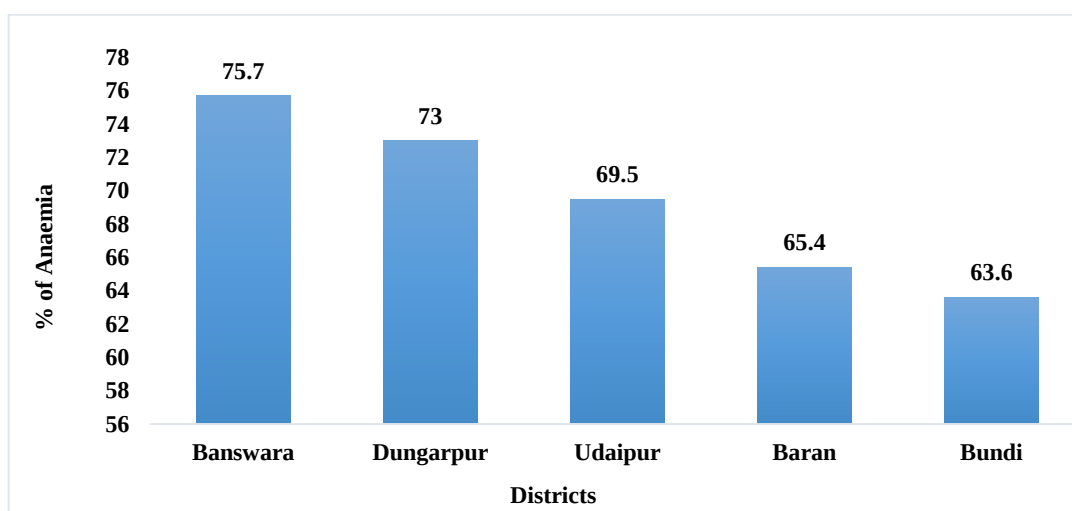


Fig 6.1: Districts of Rajasthan with highest prevalence of anaemia

This graph shows the districts having higher prevalence of anaemia among women of reproductive age group in Rajasthan.

Factors such as place of residence, educational status, Wealth, BMI, caste or tribe, current pregnancy, currently breastfeeding and total children ever born are positively associated with anaemia prevalence in all the districts. The prevalence of anaemia was higher among women residing in rural areas in comparison to women in urban areas. Anaemia is more prevalent in poorer women than in richer women. Lower BMI and economic status increases the risk of anaemia in women. Currently breastfeeding women and women with more than 5 children have higher anaemia prevalence than non-breastfeeding women and women with less number of children.

CONCLUSION

This study reveals the current situation of prevalence of anaemia among women of reproductive age group in Rajasthan. Overall prevalence rate of anaemia in Rajasthan is 47.8 percent among women aged 15-49 years with the highest prevalence in Banswara (75.7%), Durgapur (73%), Udaipur (69.5%), Baran (65.4%) and Bundi (63.6%) districts. This clearly showed that anaemia is a significant problem in women of reproductive age group. Therefore, there is a need of further research studies to determine prevalence as well as causes of anaemia and other nutritional deficiencies while considering factors such as place of residence, current pregnancy, educational level, wealth index, BMI, total children ever born while planning these studies.. This will help in treating anaemia accordingly at early stage. Educational level and socio-economic status of all women should be improved. Strategies for new programs are required to improve the overall nutritional status of the women of reproductive age group. Anaemia Surveillance and intervention programs including periodic deworming, IFA supplementation and food fortification are required especially for high risk population.

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