



PREVALENCE OF ANEMIA AMONG PREGNANT WOMEN ATTENDING RURAL AND URBAN HEALTH CENTERS IN UDAIPUR

Community Medicine

Dr. Chandra Prakash Sharma	Associate Professor, Department Of Community Medicine R.N.T Medical College, Udaipur
Dr. Shikha Mehta	Assistant Professor, Department Of Community Medicine R.N.T Medical College, Udaipur.
Dr Mahendra Singh Rathore	Assistant Professor, Department Of Community Medicine R.N.T Medical College, Udaipur.
Dr. Pratap Bhan Kaushik	Assistant Professor, Department Of Community Medicine Dr D.Y Patil Medical College Hospital & Research Centre, Pune

ABSTRACT

Background: Anemia in pregnancy remains a significant public health concern, particularly in low- and middle-income countries. This study investigates the prevalence and severity of anemia among pregnant women in rural and urban health centers in Udaipur and examines associated demographic and socioeconomic factors. **Methods:** A cross-sectional study was conducted in Udaipur's rural and urban health centers, including 420 pregnant women (210 each from rural and urban areas). Hemoglobin levels were measured, and anemia was classified as mild, moderate, or severe according to World Health Organization (WHO) criteria. Statistical analyses included Chi-square and t-tests to assess differences between groups, with significance at $p < 0.05$. **Results:** The overall prevalence of anemia was significantly higher in rural areas (100%) compared to urban areas (80.9%) ($p < 0.001$). The mean hemoglobin level was lower among rural women (9.2 ± 0.8 g/dL) than urban women (10.3 ± 1.1 g/dL). Severe anemia was more prevalent in rural women (9.5%) than in urban women (4.8%) ($p = 0.048$). The prevalence of anemia was substantially correlated with demographic characteristics, such as poor socioeconomic position (71.4% in rural vs. 38.1% in urban, $p < 0.001$) and illiteracy (40.5% in rural vs. 19.0% in urban, $p < 0.001$). **Conclusion:** Pregnant women in Udaipur suffer from anemia at a high rate, with rural areas being disproportionately affected. These findings highlight the need for region-specific interventions, including improved nutritional education, routine antenatal care, and targeted supplementation programs.

KEYWORDS

Anemia, Pregnant Women, Prevalence, Rural Health, Hemoglobin Levels Socioeconomic Factors

INTRODUCTION

Pregnant women are mostly affected by anemia, a serious global health concern, particularly in developing countries. It is characterized by a decrease in hemoglobin levels, which affects red blood cells' ability to carry oxygen. This can lead to a number of health issues for both the mother and the fetus. The World Health Organization (WHO) states that hemoglobin values below 11 g/dL are indicative of anemia in pregnant women, with levels below 7 g/dL being considered severe anemia. Anemia affects over 40% of pregnant women worldwide, making it a serious public health issue that requires quick attention.

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India bears a disproportionately high burden of anemia, accounting for nearly 50% of global cases among pregnant women. The National Family Health Survey (NFHS-5, 2019–21)² reported that over 57% of pregnant women in India are anemic, with a higher prevalence observed in rural areas compared to urban regions. Rajasthan, a state in northwestern India, reflects this trend, with Udaipur district being a region of concern due to its diverse demographic, socioeconomic, and healthcare accessibility challenges.³

Anemia during pregnancy is associated with significant adverse maternal and neonatal outcomes. Maternal complications include fatigue, increased susceptibility to infections, preterm labor, and postpartum hemorrhage. Neonatal outcomes range from low birth weight and preterm delivery to perinatal mortality. In addition to the clinical implications, anemia poses substantial social and economic challenges, contributing to poor productivity and increased healthcare costs.³

The etiology of anemia in pregnant women is multifactorial,

encompassing nutritional deficiencies, parasitic infections, and chronic diseases. Iron deficiency anemia (IDA) remains the most prevalent form, accounting for nearly 50% of cases worldwide. Other nutritional deficiencies, such as folate and vitamin B12, as well as chronic conditions like malaria and inflammatory diseases, further exacerbate the condition. In low-resource settings, cultural practices, dietary restrictions, and limited access to antenatal care further complicate anemia management.⁴

In urban areas, the prevalence of anemia is often attributed to dietary deficiencies and lifestyle factors. On the other hand, rural populations face unique challenges, including inadequate access to healthcare, poor sanitation, and higher rates of parasitic infections such as hookworm and malaria. These differences necessitate a region-specific approach to understanding and addressing anemia. Udaipur's mix of urban and rural populations provides an ideal setting to study these disparities and their impact on maternal health outcomes.

Government initiatives like the Anemia Mukh Bharat (AMB) program aim to reduce the prevalence of anemia in India, particularly among vulnerable groups like pregnant women. The program emphasizes iron and folic acid (IFA) supplementation, deworming, and behavior change communication. Despite these efforts, anemia remains pervasive, underscoring the need for localized studies to identify gaps in implementation and adherence.⁵

This study aims to investigate the prevalence and risk factors of anemia among pregnant women attending urban and rural health centers in Udaipur. By comparing the two settings, this research seeks to elucidate the social, economic, and healthcare-related factors contributing to anemia and its outcomes. Understanding these determinants is crucial for developing targeted interventions and optimizing maternal and neonatal health outcomes.

Objectives Of The Study

To determine the prevalence of anemia among pregnant women attending urban and rural health centers in Udaipur.

Hypothesis

Null Hypothesis: There is no significant difference in the prevalence

and outcomes of anemia between urban and rural health centers in Udaipur.

Alternative Hypothesis: There is a significant difference in the prevalence and outcomes of anemia between urban and rural health centers in Udaipur.

Significance Of The Study

The findings of this study have the potential to inform policymakers and healthcare providers about the specific needs of urban and rural populations in Udaipur. By identifying risk factors and gaps in current interventions, this research can contribute to the design of more effective, targeted programs to combat anemia. Furthermore, the study underscores the importance of addressing anemia as part of a broader strategy to improve maternal and child health in India.

Methodology

Study Design:

A cross-sectional study will determine the prevalence of anemia among pregnant women in Udaipur's rural and urban health centers.

Study Area:

The study was conducted in rural and urban health centers of the field practice area of RNT Medical College in Udaipur district, Rajasthan.

Study Population:

Pregnant women attending antenatal care (ANC) at the selected rural and urban health centers will be included during the study period.

Inclusion Criteria:

- Pregnant women attending ANC at the selected centers.
- Women who consent to participate in the study.

Exclusion Criteria:

- Pregnant women with known chronic diseases unrelated to anemia (e.g., genetic disorders).
- Women not consenting to participate.

Sample Size Calculation:

The sample size is determined using the formula:

$$n = Z^2 \cdot P(1-P) / d^2$$

Where:

n = required sample size

Z = Z statistic for a 95% confidence level (1.96)

P = estimated prevalence of anemia (52.2% from NFHS-5)¹

d = precision (5% or 0.05)

$$n = (1.96)^2 \cdot 0.522 \cdot (1 - 0.522) / (0.05)^2$$

$$n = 383$$

Considering equal representation from rural and urban populations, the sample will include 192 pregnant women from each center. Adding a 10% non-response rate, the final sample size is rounded to 420 (210 for each center).

Sampling Method:

Systematic random sampling will be used to select participants from the ANC registers at the health centers.

Data Collection Tools:

Structured Questionnaire:

A pre-tested and semi-structured questionnaire used to gather information about demographics, socioeconomic, etc, for ANC Mothers.

Statistical Analysis: All collected data were entered in Microsoft Excel 2013 and analyzed using SPSS software. Quantitative data (mean, SD) were calculated, and the “t” test was used to compare the mean difference between the two groups for baseline characteristics. For qualitative data, percentages were calculated, and the Chi-square tests were used to find the association between two attributes. A p-value < 0.05 will be considered statistically significant.

RESULT:

Table 1. Demographic Characteristics of the Study Population

Characteristic	Rural (n=210)	Urban (n=210)	p-value
Age (years)			
≤ 20 years	40 (19.0%)	35 (16.7%)	0.64
21-30 years	130 (61.9%)	140 (66.7%)	

≥ 31 years	40 (19.0%)	35 (16.7%)	
Education Level			
Illiterate	85 (40.5%)	40 (19.0%)	<0.001
Primary	75 (35.7%)	50 (23.8%)	
Secondary and above	50 (23.8%)	120 (57.2%)	
Socioeconomic Status			
Low	150 (71.4%)	80 (38.1%)	<0.001
Middle	45 (21.4%)	90 (42.9%)	
High	15 (7.1%)	40 (19.0%)	

The majority of participants in both rural (61.9%) and urban (66.7%) centers belong to the 21-30 age group, which indicates that most pregnancies occur during this reproductive age. The proportion of younger participants (≤ 20 years) is slightly higher in rural areas (19.0%) compared to urban areas (16.7%), but this difference is not statistically significant (p-value = 0.64). Similarly, participants aged ≥ 31 years are evenly distributed between rural and urban centers (19.0% and 16.7%, respectively). A notable disparity exists in education levels between rural and urban participants. A significantly higher proportion of rural women are illiterate (40.5%) compared to urban women (19.0%). Urban participants show a markedly higher level of education, with 57.2% having completed secondary education or higher, compared to only 23.8% in rural areas. The difference in education levels is statistically significant (p-value < **0.001**), highlighting educational disparities between rural and urban regions. Socioeconomic status also varies significantly between rural and urban participants. Most rural participants (71.4%) fall into the low socioeconomic category, compared to only 38.1% of urban participants. In contrast, urban participants have a higher proportion in the middle (42.9%) and high (19.0%) socioeconomic categories than their rural counterparts. This difference is statistically significant (p-value < **0.001**), indicating the economic disparities between rural and urban populations.

Table 2. Prevalence Of Anemia

Anemia Category	Rural (n=210)	Urban (n=210)	p-value
Mild (10-11 g/dL)	90 (42.9%)	70 (33.3%)	0.03*
Moderate (7-9.9 g/dL)	100 (47.6%)	90 (42.9%)	
Severe (<7 g/dL)	20 (9.5%)	10 (4.8%)	
Total Prevalence	210 (100%)	170 (80.9%)	

The prevalence of mild anemia is higher in rural participants (42.9%) compared to urban participants (33.3%). Moderate anemia is the most common in rural (47.6%) and urban (42.9%) populations. The prevalence of severe anemia is higher in rural areas (9.5%) compared to urban areas (4.8%). The total prevalence of anemia is significantly higher in rural areas (100%) compared to urban areas (80.9%), underscoring a substantial rural-urban disparity in anemia burden among pregnant women. This difference is statistically significant (p-value = **0.03**), indicating a notable variation in the mild anemia prevalence between the two groups.

Table 3. Mean Hemoglobin Level

Parameter	Rural (Mean ± SD)	Urban (Mean ± SD)	p-value
Hemoglobin (g/dL)	9.2 ± 1.5	10.3 ± 1.3	<0.01

The mean hemoglobin level among rural participants is 9.2 ± 1.5 g/dL, which falls within moderate anemia. In urban participants, the mean hemoglobin level is 10.3 ± 1.3 g/dL, indicating that, on average, they have a milder form of anemia than their rural counterparts. The difference in mean hemoglobin levels between rural and urban groups is statistically significant (p-value < **0.01**). This indicates that urban participants generally have higher hemoglobin levels than rural participants.

DISCUSSION

The findings of this study reveal a significant disparity in the prevalence of anemia among pregnant women in rural and urban areas of Udaipur. The overall prevalence was notably higher in rural areas (100%) compared to urban areas (80.9%). These results align with previous studies highlighting a higher burden of anemia in rural populations due to factors such as poor nutritional intake, limited access to healthcare, and lower socioeconomic status (Sharma S. et al, 2019). Furthermore, the significantly lower mean hemoglobin levels in rural areas (9.2 g/dL) compared to urban areas (10.3 g/dL) underscore the urgency of targeted interventions in resource-constrained settings. The association between anemia severity and rural residency could

also be attributed to inadequate antenatal care and lower health awareness among rural women (NFHS-5, 2020-21).

The demographic differences between rural and urban populations further emphasize the structural inequalities contributing to this health disparity. Rural women had higher illiteracy rates (40.5% vs. 19.0%) and belonged predominantly to lower socioeconomic strata (71.4% vs. 38.1%), both of which are recognized risk factors for anemia (WHO, 2021). The higher prevalence of severe anemia in rural areas (9.5% vs. 4.8%) is concerning, as it poses significant risks for maternal and fetal health, including preterm delivery, low birth weight, and increased maternal mortality. Urban women, while better off socioeconomically, still exhibited moderate levels of anemia, indicating the need for universal strategies to address nutritional deficiencies and ensure adequate iron supplementation during pregnancy. These results emphasize the importance of strengthening healthcare delivery systems and tailoring interventions to meet rural and urban populations' unique needs.

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