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Research Article

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Anemia in Reproductive Age Group Women Attending in General Health Check-up in the Tertiary Care Centre in Kathmandu, Nepal: A Descriptive Cross-sectional Study

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Abstract

Background: *Anemia is common, particularly among women in Southeast Asia and other Asian countries. In reproductive-age women (15-49 years), increased demand without adequate supply often leads to deficiency. This study aimed to determine the prevalence of anemia in this group.*

Methods: *A descriptive cross-sectional study was conducted among women of reproductive age (15-49 years) visiting Tribhuvan University Teaching Hospital August 1st 2024 to October 20th 2024, following ethical approval. Exclusions included those with chronic diseases, incomplete data, heavy menstrual loss, or pregnancy complications. A convenience sampling method was used, yielding 372 participants. Data were recorded in MS Excel and analyzed in SPSS.*

Results: *Our study of 372 participants (mean age 35.39 ± 8.73 years) found that 22.8% were women aged 40-44 years. BMI analysis showed 43% were overweight, and 34.1% had normal BMI. Blood group distribution was 27.4% A+ and 28.8% B+, with A- being the least common (0.3%). Most participants (75.3%) were from the Hill region, and 71.8% were unmarried. Anemia prevalence was 24.46%, highest in the 45-49 age groups and lowest in the 20-24 groups. Anemia was more common in the underweight (44.44%) and very obese (50%) groups and most prevalent among Terai region women (35.59%).*

Conclusion: *The study found a significant prevalence of anemia among women of reproductive age, with higher rates observed in specific age groups, BMI categories, and geographic regions. This highlights the need for targeted interventions to address anemia in vulnerable populations.*

Keywords: Anemia, Reproductive age, Prevalence

1. Introduction

Anemia is a condition in which the number of red blood cells is insufficient to meet the body's physiological needs. Women of the reproductive age group are at high risk of developing anemia which in turn contributes to maternal morbidity and mortality [1]. The Reproductive age group is defined as age between 15-49 years of age. It is a significant public health concern impacting approximately half a billion women aged 15-49 years. In 2019, WHO estimates 30% (539 million) of non-pregnant women and 37% (32 million) of pregnant women aged 15-49 years were affected by anemia [2]. Anemia is significant public health problem in developing countries despite advancements in health area. Approximately about one-third of population is affected by anemia globally [3]. Prevalence of anemia is high in women of southeast area and Asian countries. Reduction in anemia has been stalled, despite the implementation of different maternal health and nutritional program. This study aimed to assess the prevalence of anemia in reproductive age group [4]. It is estimated that nearly half a billion of women from reproductive age are affected by anemia. Nearly four out of ten (38.5%) women of reproductive age (WRA) were anemic in Nepal. SDG number two has a specific target of reducing anemia prevalence among WRA by less than

one per cent by 2030.

There are numerous and complex factors that can cause anemia. Moreover, another 20 per cent of deaths are caused due to anemia related causes such as sepsis, hemorrhage or other indirect causes of anemia. Besides these, anemia is responsible for serious health consequences during and after pregnancy not only for mothers but for babies too [5]. Deworming programme, outreach clinic at the community level, iron supply free of cost are some examples. Despite these efforts by the government, the proportion of anemic women has not decreased as per the anticipation throughout the decade in Nepal [6]. Poor maternal health is also associated with low birth outcomes including maternal morbidity and mortality [7]. Lower concentration of the hemoglobin in the blood affects the circulation of oxygen throughout the body including the brain which limits the maternal and birth outcomes, leads to high morbidity and mortality among mothers and neonates, reduces the working ability and productivity including learning capacity [8]. Anemia prevalence is common around the globe but is most prevalent in developing countries. Prevalence of anemia was recorded higher in the South Asian and African continent than in other countries throughout the world [9]. In South Asia, anemia reduced from 53% in 1995 to 47% in 2011 [10]. Consequently, public health programmes were implemented to increase the coverage of several anemia prevention programmes such as iron-folic acid (IFA) supplementation and deworming programme targeted at pregnant and postpartum women and children [11]. Iron deficiency anemia remains one of the most important nutritional problem in Indonesia. The neonatal household health survey shows the prevalence of anemia in women of reproductive age being 27% and 40%in pregnant women. Based on Nepalese department of health services the prevalence of anemia in women of reproductive age group was 35% [12].

The aim of the study is to find the prevalence of anemia among reproductive age women (15-49) years in tertiary center presenting in general checkup.

2. Methods

This descriptive cross-sectional study was conducted among reproductive-age women visiting Tribhuvan University Teaching Hospital in Kathmandu, Nepal, for general health checkups in the Department of General Practice. Data collection took place from August 1st 2024 to October 20th 2024, following ethical approval from the Institutional Review Committee of the Institute of Medicine. The study included women aged (15-49) who came for general health checks in the outpatient department and provided informed consent. Exclusions were made for women with chronic diseases (such as kidney disease, malignancies, or blood disorders), those with incomplete or unreliable data (including missing hemoglobin levels), individuals with a history of heavy menstrual bleeding requiring medical intervention, and those who had recently given birth with significant complications (e.g., postpartum hemorrhage or complicated cesarean sections), as well as those in the immediate postpartum period (within the first six weeks after delivery). A convenience sampling method was employed.

The sample size was calculated using the following formula:
Sample size (N) $=Z^2PQ/e^2$
Where;
N= Sample size
Z= Standard error associated with the chosen level of confidence.
P= Variability/Standard deviation
Q= 1-P
e = Acceptable sample error.
Using the above formula with, z=1.96, P=41%, Q=1-P=1-P= 100-41 = 59 e = 5, the calculated sample size is 371.55 i.e. 372.

The calculated minimum required sample size was 372. Hemoglobin levels and routine blood investigations were recorded. Demographic data, including age and body mass index, along with clinical features such as history of hypertension and diabetes mellitus, were also collected. Vital signs, including pulse rate, blood pressure, and respiratory rate, were documented. Anemia was diagnosed based on serum hemoglobin levels in accordance with the World Health Organization (WHO) guidelines. WHO has defined anemia as mild, moderate, or severe based on the following cutoff values (g/dl) for hemoglobin level for non pregnant: Mild=11-11.9, Moderate=8.0-10.9, Severe=<8.0 (13).The data were entered into Microsoft Excel 2016, with completeness verified by a second investigator to ensure accuracy and eliminate duplication. Statistical analysis was conducted using Microsoft Excel 2016 and IBM SPSS Statistics version 18.0. Point estimates and 95% confidence intervals were calculated.

3. Results

Our study included 372 participants with an average age of 35.39 years (SD =8.73 years). Of the participants, 22.8% were women aged 40-44 years, followed by 18.3% aged 44-49 and 15.9% aged 25-29 years. Based on the Body Mass Index (BMI), 43.0% were overweight, and 34.1% had a normal BMI. Blood group distribution showed that 27.4% were A+ and 28.8% were B+, with A- being the least common at 0.3%. Three-quarters (75.3%) of the participants were from the Hill region, and the majority (71.8%) were unmarried (Table 1). An unpaired t-test revealed that hemoglobin, packed cell volume (PCV), and cholesterol levels were significantly different in relation to anemia, while other variables such as age, BMI, pulse rate, respiratory rate, temperature, RBC count, platelet count, serum levels, T3, T4, and TSH did not show significant differences (Table 2).

The overall prevalence of anemia was 24.46%, with the highest prevalence observed in the 45-49 age groups and the lowest in the 20–24 age groups. By BMI category, anemia prevalence was highest in the underweight (44.44%) and very high obesity (50%) groups and lowest in the normal BMI group (21.25%). Anemia prevalence was highest among women from the Terai region (35.59%) compared to those from the Hill (22.5%) and Mountain (21.21%) regions. There was no significant association between anemia and demographic variables such as age group, BMI, region, or marital status (Table 3).

Variables		Frequency	Percent
Age Group (in years)	15 - 19	15	4.0
	20 - 24	37	9.9
	25 - 29	59	15.9
	30 - 34	51	13.7
	35 - 39	57	15.3
	40 - 44	85	22.8
	45 - 49	68	18.3
BMI (in kg/m^2)	Underweight	18	4.8
	Normal	127	34.1
	Overweight	160	43.0
	Obesity	65	17.5
	Obesity very high	2	.5
Blood Group	A -ve	1	0.3
	A +ve	102	27.4
	AB +ve	40	10.8
	B +ve	107	28.8
	B-ve	1	.3
	O -ve	5	1.3
	O +ve	116	31.2
Region	Hill	280	75.3
	Mountain	33	8.9
	Terai	59	15.9
Marital status	Unmarried	267	71.8
	Married	105	28.2
	Total	372	100.0

Table 1: Demographics of Population

Variables	Anemic	N	Mean	Std. Deviation	Std. Error Mean	p value
AGE	Yes	91	36.53	8.61	0.90	0.154
	No	281	35.02	8.76	0.52	
BMI	Yes	91	25.95	5.21	0.54	0.763
	No	281	26.12	4.48	0.26	
PULSE (beats/min)	Yes	90	81.39	11.48	1.21	0.393
	No	281	82.55	11.08	0.66	
RESPIRATORY RATE (per minute)	Yes	90	20.06	8.73	0.92	0.516
	No	281	19.58	4.95	0.29	
TEMPERATURE (in F)	Yes	90	96.31	8.92	0.94	0.338
	No	281	94.93	12.70	0.75	
HEMOGLOBIN	Yes	91	10.91	1.10	0.11	<0.001
	No	281	13.48	0.90	0.05	
PCV	Yes	89	33.96	3.15	0.33	0.022
	No	281	44.69	43.92	2.62	

RBC	Yes	89	4.21	0.44	0.04	0.98
	No	281	10.14	53.58	3.19	
PLATELETS	Yes	89	289011.24	379866.82	40265.80	0.073
	No	281	246441.28	67788.57	4043.92	
CHOLESTEROL	Yes	90	4.29	.81135	.08552	0.008
	No	281	4.57	.88779	.05296	
SERUM TRIGLYCERIDES	Yes	90	1.1189	0.54	0.05	0.123
	No	281	1.3110	1.13	0.06	
SERUM URIC ACID	Yes	90	277.46	81.26	8.56	0.197
	No	281	288.79	69.30	4.13	
BLOOD SUGAR	Yes	90	4.32	0.51	0.05	0.685
	No	281	4.43	2.62	0.15	
BLOOD UREA	Yes	90	3.14	1.02	0.10	0.480
	No	281	3.40	3.41	0.20	
CREATININE	Yes	90	53.02	12.93	1.36	0.655
	No	281	54.53	31.37	1.871	
SGPT	Yes	90	21.85	13.33	1.40	0.630
	No	281	23.14	24.20	1.44	
LDL	Yes	90	2.86	0.77	0.08	0.071
	No	281	3.03	0.75	0.04	
T3	Yes	13	4.15	0.55	0.15	0.412
	No	50	4.48	1.38	0.19	
T4	Yes	13	12.54	1.19	0.33	0.686
	No	50	12.34	1.64	0.23	
TSH	Yes	13	2.92	2.06	0.57	0.138
	No	50	2.00	1.94	0.27	
VIT D	Yes	1	12.00	-	-	0.121
	No	2	16.50	0.70	.50	
VIT B12	Yes	0	-	-	-	-
	No	2	216.50	96.87	68.50	

Table 2: Relation of Anemia with continuous demographic and blood test parameters.

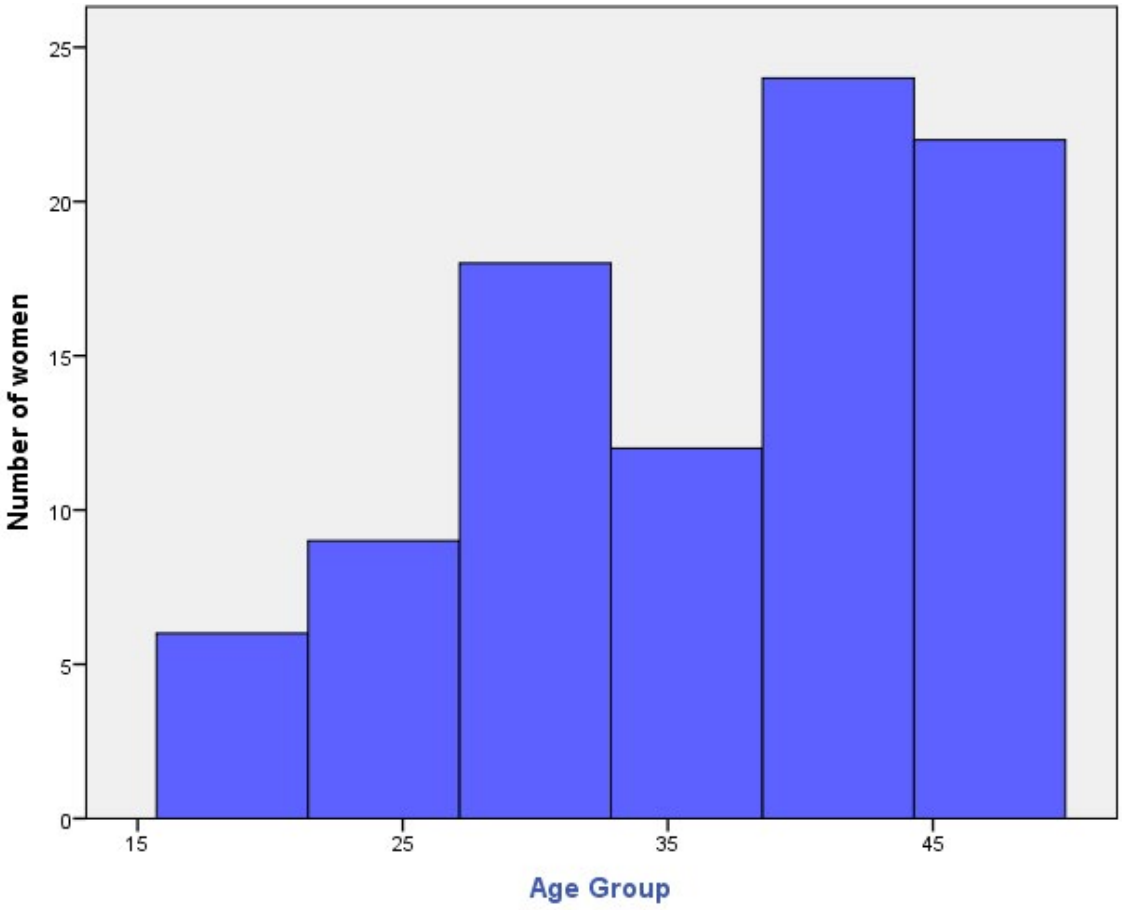

Figure 1: Age group wise distribution of anemic women

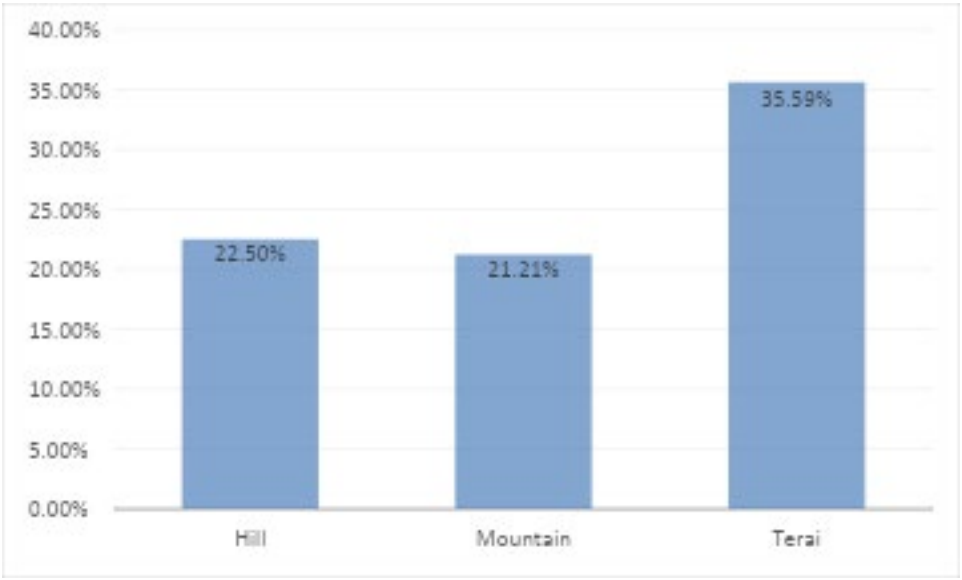

Figure 2: Distribution of Anemia by region wise.

Variables		Percent of Anemia	Level of Anemia			Total	pvalue
			Mild	Moderate	Severe		
Age Group In years	15 - 19	26.67	2	2	0	4	0.876
	20 - 24	13.51	4	1	0	5	
	25 - 29	22.03	8	5	0	13	
	30 - 34	31.37	10	6	0	16	
	35 - 39	14.03	4	4	0	8	
	40 - 44	27.05	18	4	1	23	
	45 - 49	32.35	13	8	1	22	
BMI in Kg/m^2	Underweight	44.44	3	5	0	8	0.199
	Normal	21.25	16	9	2	27	
	Overweight	24.37	28	11	0	39	
	Obesity	24.61	12	4	0	16	
	Obesity very high	50.00	0	1	0	1	
Region	Hill	22.50	41	20	2	63	0.567
	Mountain	21.21	6	1	0	7	
	Terai	35.59	12	9	0	21	
Marital status	Unmarried	23.97	42	21	1	64	0.811
	Married	25.71	17	9	1	27	
Oedema	Mild pedal		1	0	0	1	0.630
	No		58	29	2	89	
	Present on left foot		0	1	0	1	
Pallor	Mild pal		2	0	0	2	0.150
	No		57	26	2	85	
	Present		0	2	0	2	
	Yes		0	2	0	2	
Total			59	30	2	91	

Table 3: Distribution of Anemia and its level by demographic variables

Variables		B	S.E.	p value	Odds Ratio (OR)	95% C.I. for OR	
						Lower	Upper
Age Group	15 - 19				Ref.	-	-
	20 - 24	-0.274	0.639	0.668	0.760	0.217	2.659
	25 - 29	-1.119	0.546	0.041	0.327	0.112	.953
	30 - 34	-.526	0.407	0.196	0.591	0.266	1.313
	35 - 39	-0.045	0.398	0.910	0.956	0.438	2.085
	40 - 44	-1.075	0.461	0.020	0.341	0.138	.843
	45 - 49	-0.254	0.356	0.476	0.776	0.386	1.559
Region	Hill			0.099	Ref.	-	-
	Mountain	-0.644	0.307	0.036	0.525	0.288	0.959
	Terai	-0.719	0.505	0.155	0.487	0.181	1.311
BMI	Underweight			0.291	Ref.	-	-
	Normal	-.223	1.492	0.881	0.800	0.043	14.886

	Overweight	-1.309	1.431	0.360	0.270	0.016	4.459
	Obesity	-1.132	1.426	0.427	0.322	0.020	5.275
	Obesity very high	-1.119	1.443	0.438	0.327	0.019	5.526

Table 4: Odds Ratio and Confidence Interval of Anemia with demographic variable

4. Discussion

This study assessed the demographic and biochemical determinants of anemia, a significant public health issue in our population, focusing on associations with age, BMI, and biochemical parameters such as hemoglobin, hematocrit (PCV), and cholesterol levels. Our findings discuss the multifactorial nature of anemia and provide critical perspectives for targeted public health interventions. Our study indicates that age and geographic region significantly impact anemia prevalence. Notably, women aged 45-49 years showed the highest anemia prevalence (32.35%), followed by those aged 40-44 years (27.05%). These findings align with established research suggesting that women in later reproductive years may be more susceptible to anemia due to cumulative menstrual blood loss and hormonal changes approaching menopause [14,15]. Conversely, anemia rates were notably lower in younger age groups.

The geographic distribution of anemia reveals a significant disparity, with the highest prevalence in the Terai region (35.59%) compared to the hill (22.5%) and mountain (21.21%) regions. This finding may reflect variations in dietary habits, socioeconomic conditions, and access to healthcare resources across regions, supporting previous studies that have identified geographic influences on anemia prevalence [16]. These regional differences underscore the need for tailored anemia prevention strategies in the Terai region.

Our study did not find a statistically significant association between BMI and anemia, yet anemia was more prevalent among the underweight and obese groups. Particularly, 50% of individuals in the "very high obesity" category were anemic, a finding that aligns with emerging evidence linking both under nutrition and obesity to anemia due to malnutrition or malabsorption of essential nutrients [17]. This highlights a nuanced relationship between body weight and anemia risk, emphasizing the importance of understanding how BMI influences iron metabolism and the prevalence of anemia.

Biochemical parameters, especially hemoglobin and PCV levels, showed strong associations with anemia. Lower hemoglobin and PCV levels were observed in anemic individuals ($p < 0.001$ and $p = 0.022$, respectively), corroborating their established roles as primary indicators of anemia (18). Additionally, cholesterol levels were significantly lower in the anemic population ($p= 0.008$), which may be indicative of underlying inflammatory processes or decreased erythrocyte membrane production in anemic states. This finding aligns with existing literature linking hypercholesterolemia to anemia, although the precise mechanisms remain to be fully elucidated [18].

The odds ratio analysis revealed that certain age groups, notably those aged 25-29 years and 40-44 years, demonstrated a reduced risk of anemia ($p=0.041$ and $p=0.02$, respectively) [19]. These groups may have protective lifestyle factors, possibly due to increased health awareness, dietary supplementation, or other sociodemographic variables. Additionally, living in mountainous areas was associated with reduced odds of anemia, potentially due to dietary adaptations that include iron-rich foods or environmental acclimatization that may enhance erythropoiesis at higher altitudes [20].

This study's cross-sectional design limits our ability to establish causation between the identified factors and anemia risk. Longitudinal studies could offer insights into the temporal relationship between these demographic and biochemical factors and the development or resolution of anemia. Additionally, the inconsistent findings related to certain biochemical markers, such as vitamin B12 and vitamin D, highlight the need for a larger sample size in future studies to verify these relationships more robustly.

5. Conclusion

Our study reveals a significant prevalence of anemia among women of reproductive age in Nepal, with overall prevalence of anemia being 24.46%, with the highest prevalence observed in the 45-49 age groups and the lowest in the 20-24 age groups. The findings emphasize the urgent public health challenge posed by anemia, which impacts maternal health and contributes to morbidity and mortality. Identified demographic and biochemical factors highlight the need for targeted interventions, such as nutritional education and improved access to healthcare services. Future longitudinal studies are essential to establish causal relationships and refine prevention strategies. Collaboration among healthcare providers, policymakers, and community organizations is vital to reduce prevalence and enhance the health of women in this critical age group.

Author Contributions

YLS, DCA, KKY, SA, SA reviewed the literature, conceptualized and designed the research; KKY, SA, SA, YLS did data collection, analysis and prepare result, YLS, MY, NAS, IG, KKY, ST, YMS drafted the manuscript; and all authors reviewed the manuscript and approved the final version of the manuscript. All authors agreed to be accountable for all aspects of the research work.

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Ethical Approval: This research was approved by IRC of Institute of Medicine, Tribhuvan University with the reference number 178(6-11) E2

Consent/Assent: Informed written consent was obtained from the all the participants before data collection.

Data Availability Statement: The data that support the findings of this study are available within the article and/or its supplementary materials.

Conflicts of Interest: There is no financial or non-financial conflict of interest any of the authors.

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