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THE PREVALENCE OF MATERNAL ANEMIA: DIETARY PRACTICES, EPIDEMIOLOGICAL FACTORS, AND NUTRIENT INTAKE PATTERNS AMONG PRIMIGRAVIDAE OF PATHAN ETHNICITY IN DISTRICT PESHAWAR

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Abstract

Background
Dietary habits and nutritional consumption are important factors in determining health outcomes. Nutrient deficiencies and diet-related disorders are caused by several epidemiological risk factors, such as lifestyle, heredity, and financial status. Designing focused interventions can be made easier with an understanding of these aspects.

Objectives
This study aims to analyze epidemiological risk factors associated with dietary and nutrient intake patterns in primigravidae. It aimed at how socioeconomic conditions, and health behaviors influence nutrition and overall well-being.

Methodology: *This cross-sectional study evaluated dietary intake through food frequency questionnaires and 24-hour dietary recalls. Epidemiological data were obtained via structured interviews and health assessments. Statistical analysis was conducted to identify associations between risk factors and nutrient intake patterns*

Results
The study found that dietary and nutrient intake patterns were significantly influenced by socioeconomic status, education level, and lifestyle factors. Individuals from lower-income groups had lower intakes of essential micronutrients such as iron, calcium, and vitamin D, and a much lower protein intake primarily due to limited access to diverse food options. In contrast, higher-income groups had better dietary diversity but were more prone to excessive caloric intake and poor food choices. Age was also an evident factor, with younger women consuming higher amounts of processed foods and sugars.

Conclusion
Food intake patterns are shaped and influenced by various epidemiological factors, which affect nutritional intake and overall health. Public health initiatives should aim to tackle socioeconomic inequalities and encourage well-rounded nutrition to mitigate anemia and other health risks related to diet in pregnant women.

INTRODUCTION

Hemoglobin plays a crucial role in transporting oxygen to body tissues and facilitating the removal of carbon dioxide via the lungs. Anemia occurs when the body has insufficient red blood cells (RBCs) or when hemoglobin levels are too low to support proper oxygen transportation. This condition can lead to various complications, including fatigue, weakness, dizziness, and cognitive impairment (Bhadra & Deb, 2020). Severe anemia can be life-

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threatening, particularly in vulnerable populations such as children and pregnant women.

Anemia is recognized as one of the most prevalent nutritional disorders worldwide, affecting millions of people across different socioeconomic backgrounds. The World Health Organization (WHO) estimates that over 1.62 billion individuals, or approximately 24.8% of the global population, suffer from anemia (WHO, 2008). The condition poses a significant public health concern due to its detrimental effects on human health, economic productivity, and overall social development (WHO, 2005). Malnutrition, particularly micronutrient deficiencies, is the leading cause of anemia, affecting both developing and developed nations (Kassebaum, 2014).

Among the various forms of anemia, nutritional anemia is the most common, primarily caused by a lack of essential nutrients such as iron, vitamin B12, and folic acid. Iron deficiency anemia (IDA) remains the predominant type, accounting for nearly 50% of all anemia cases worldwide (Tolentino & Friedman, 2007). Other contributing factors include parasitic infections, chronic diseases, and genetic disorders that impair hemoglobin production or RBC survival (Lutter, 2008).

Pregnant women are at a heightened risk of developing anemia due to the increased iron and nutritional demands of pregnancy. Global data suggest that 56% of pregnant women in low- and middle-income countries (LMICs) are anemic, with the highest prevalence recorded in Sub-Saharan Africa (57%), followed by Southeast Asia (48%) and South America (24.1%) (Stevens et al., 2013). In India, anemia affects more than 50% of pregnant women, contributing to adverse maternal and neonatal health outcomes (Kassebaum et al., 2014). Studies from Pakistan have also highlighted a high prevalence of anemia among pregnant women, with iron deficiency being the primary cause (Ansari, 2008; Karim et al., 1994).

Anemia during pregnancy can result in severe maternal health complications, including fatigue, reduced immune function, and an increased risk of infections. More serious cases can lead to cardiovascular problems, postpartum hemorrhage, and maternal mortality (Stephen et al., 2018). According to some studies, anemia accounts for 23% of indirect maternal deaths in developing countries (Smith et al., 2019). This highlights the urgent need for targeted interventions to address anemia during pregnancy and improve maternal health outcomes.

The effects of anemia extend beyond maternal health, significantly impacting fetal development and neonatal outcomes. Anemic mothers are more likely to experience preterm labor and give birth to low-birth-weight infants (Stoltzfus et al., 2004). Additionally, intrauterine growth restriction (IUGR) and intrauterine fetal death (IUFD) have been linked to maternal anemia, increasing the likelihood of long-term developmental issues in affected infants (Smith et al., 2019). Low hemoglobin levels during pregnancy can also impair oxygen supply to the fetus, leading to complications such as stunted growth and cognitive delays in childhood (Allen, 2000).

Children born to anemic mothers are at a higher risk of developing anemia themselves, perpetuating an intergenerational cycle of malnutrition and poor health. Childhood anemia has been associated with impaired cognitive function, decreased academic performance, and reduced physical growth (Lutter, 2008). This condition can have long-term socioeconomic implications, affecting a child's ability to achieve their full potential and contribute to society (Kassebaum, 2014). Addressing maternal anemia is, therefore, a crucial step in breaking the cycle of malnutrition and promoting healthier future generations.

The diagnosis of anemia is primarily based on laboratory tests such as complete blood counts (CBC), which measure hemoglobin levels and RBC counts. Additional diagnostic evaluations, including iron studies and vitamin B12 assessments, help determine the underlying cause of anemia (Bhadra & Deb, 2020). A thorough medical history and physical examination are also essential in identifying risk factors and guiding appropriate treatment strategies (Stephen et al., 2018).

Management of nutritional anemia typically involves dietary modifications, supplementation, and, in severe cases, medical interventions such as blood transfusions. Iron-rich foods such as leafy greens, lean meats, and fortified cereals are recommended to prevent and treat iron deficiency anemia (WHO, 2005). In regions with high anemia prevalence, iron and folic acid supplementation programs have been

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implemented to reduce maternal and child morbidity and mortality (Stevens et al., 2013). Public health initiatives aimed at improving dietary diversity and reducing parasitic infections have also shown promise in addressing anemia at the community level (Stoltzfus et al., 2004).

2. Methodology

2.1 Study Design

This cross-sectional study was conducted in two tertiary care units and one privately owned maternity hospital of the district Peshawar.

2.2 Sampling

A consent-based consecutive random sample of 216 pregnant women was recruited in the study.

2.3 Inclusion Criteria

To avoid the potential effects of the complications of the first trimester that women go through in pregnant women in their 2nd trimester were included in this study.

2.4: Ethical Consideration

The study was approved by the Institutional Ethical Approval Committee of the College of Home Economics, University of Peshawar (No.452/H.Eco).

2.5 Mode of Data Collection

A self-constructed questionnaire was designed and used as an instrument for the data collection from the respondents.

2.5 Data Collection

2.5.1 Demographic Data

The demographic data was collected by asking the respondents about their education, occupation, husband's education and occupation, their family income, family system, and place of residence.

2.5.2: Anthropometric Data

2.5.2.1 Height

The height of all respondents was taken in centimeters by a stadiometer. The respondents were directed to stand barefoot with heel, buttocks, shoulders, and head touching the wall and were asked to look straight.

2.5.2.2 Age

The age of all the respondents was taken in years.

2.5.2.3 Weight

Respondents were weighed in kilograms on a hard, even surface, barefoot, and without heavy clothing or items.

2.5.2.4 BMI

Body mass index is a very common method of measuring body weight. The calculation was done through the following formula:
BMI = Weight (kg)/height (m2)

2.5.2.5 Mid Upper Arm Circumference

MUAC was determined by measuring the mid-upper arm of all the respondents through inch tape.

2.6: Biochemical Data

Biochemical data was collected from the laboratory to assess the different values, including complete blood count (Total Leucocytes Count TLC, Platelets), Hemoglobin, Hematocrit, Mean Cell Volume, and Mean Cell Hemoglobin.

2.7: Dietary Intake

Dietary history was assessed using a standardized semi-quantitative food frequency questionnaire based on WHO WDDS 10 food groups and 176 food items consumed daily, weekly, monthly, rarely, or never. After pooling the data, the most consumed items were separated and were grouped into five major groups for the current study

2.8: Nutrient Analysis

The real intake of respondents was recorded on 24-hour food intake recall to ascertain their nutrient intake patterns. The food intake of each respondent was nutritionally evaluated for both macro and micro nutrients through WinDiet software.

2.9: Statistical Analysis

The data collected for all the parameters was statistically analyzed for percentage, mean, standard deviation, and coefficient of correlation through the statistical package for social sciences (SPSS).

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3. Results

3.1 Epidemiologic Characteristics of the Sample

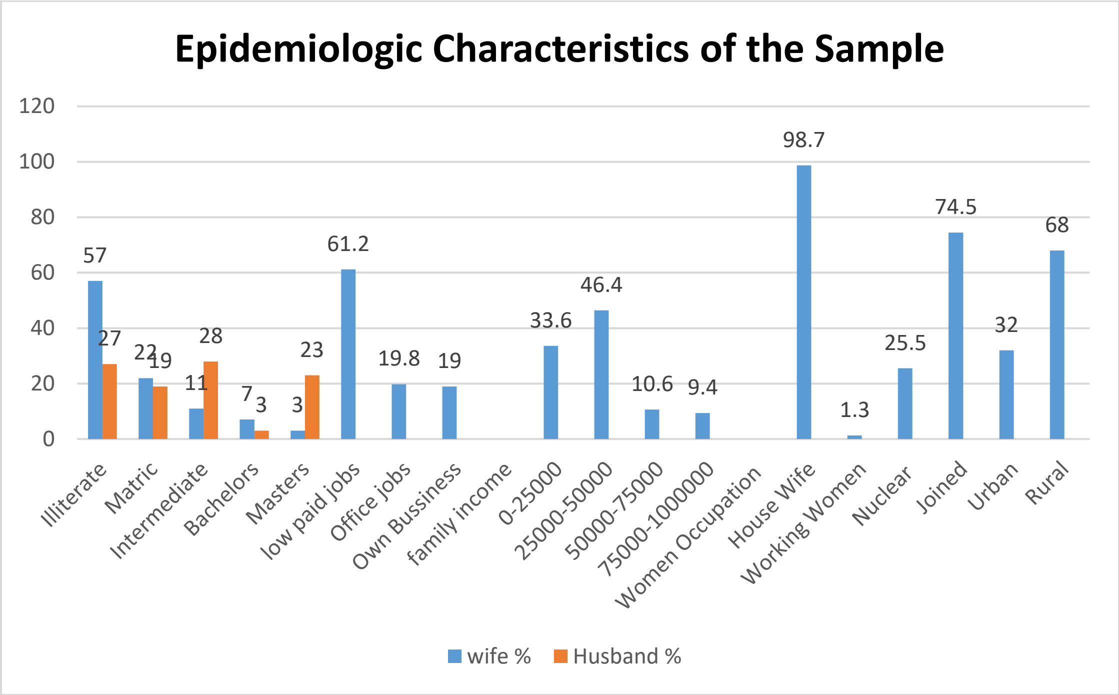

Figure 1: Epidemiological characteristics of the Respondents

The sociodemographic characteristics (Figure 1) showed that most of the women were illiterate (57%) compared to their husbands (27%), and more husbands have higher education, especially at the master's level (23% vs. 3%). Women were mostly housewives (98.7%), with a small percentage working (1.3%), and those employed were mainly in low-paid jobs (61.2%). Family income was mostly between 25,000-50,000 (46.4%), and the majority of families (74.5%) lived in an extended setup. Additionally, rural households (68%) outnumbered urban ones (32%).

Table 1: Biochemical and Anthropometry Profiles of the Respondents

Parameters	Range	Mean ± S.D	Standards	P level*	P level**
Platelets	90000-407000	12200 ± 43.294	150000-450000	0.904	0.802
Hemoglobin	7.91-14.4	10.79 ± 7.60	12-14	0.303	0.404
Hematocrit	16-78	33.76 ± 8.12	33-55	0.653	0.208
Mean cell volume	73.9-95.8	73.7 ± 7.56	76-96	0.837	0.131
Mean cell hemoglobin	25.9-59.6	15.6 ± 11.76	27-32	0.256	0.010
Weight	41-116	67.44 ± 11.54		0.004	0.562

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BMI	17.3-38.7	27.06± 23.66	18.5-24.5	0.00	0.651
MUAC	21-36.3	28.5 ± 17.21	<22.0-<27.6	0.003	0.055

*p=<0.05(based on age), **p=<0.05(based on family income

Data regarding the biochemical blood iron profiles (Table 1) of the respondents showed that platelets range from 90000-407000 (12200 ± 43.294), hemoglobin ranges from 8.9-14.3 (10.79 ± 7.60), hematocrit 16-78 (33.76±8.12), mean cell volume range from 73.9-95.8 (73.7±7.56) mean cell hemoglobin ranges from 25.9-59.6 (15.6 ± 11.76). Family income and age had no significance on hemoglobin, but the reason 11% of them were anemic was because of their poor dietary intake

At the time of their initial ANC visit, 129 (40.8%) of the 216 individuals were reported to be anemic (Hb 11.0 g/dl; mean Hb: 11.21 g/dl; range 6.8-15.1 g/dl). Among them, 79 (61.2%) had mild anemia (Hb 9.0–10.9 g/dl), 48 (37.2%) had moderate anemia (Hb 7.0–8.9 g/dl), and only two (1.6%) had severe anemia (Hb 7.0 g/dl). The anthropometric data showed an overweight trend as shown from MUAC (28.5 ± 17.21).

Table 2: Percent Distribution of Anemia Status Based on Hematologic Profiles

Parameters	Percentage
CBC	
90,000-1,30,000	23.7
1,30,001-1,50,000	20
1,50,001-4,50,000	43.7
HB	
7-10	27
11-12	62
13-14	11
HCT	
16-23	14
24-30	25
33-55	63
MCV	
20-50	10
51-70	14
75-96	79
MCH	
17-25	23.8

27-32	74
35-40	2.2

The hematological parameters with corresponding percentages of respondents (Table 2) in different ranges showed that 43.7% had a platelet count within the normal to high range (150,001-450,000), while 23.7% fell in the lower range (90,000-130,000). Hemoglobin levels indicated that 27% have low values (7-10), suggesting possible anemia, while 63% fall within 11-12. Hematocrit levels show that 63% have normal to high values (33-55%), but 14% fall in the lower range (16-23). MCV indicates that 79% have normal red blood cell size (75-96), while 10% have microcytosis (20-50). MCH values reveal that 74% fall in the normal range (27-32), while 23.8% have lower levels (17-25), which may indicate hypochromic anemia. Overall, the data suggests that while most individuals have normal hematological values, a significant proportion shows signs of anemia or other blood-related concerns.

Table 3: Meat and meat products Intake Pattern of the sample

Food Items	Daily	Weekly	Monthly 1-2 times	Rarely 2-3 Months	Never
	%	%	%	%	%
Mutton	0	09	1	48	11
Beef	8	31	29	7	3
Organ meat	0	22	15	28	30
Chicken	0	26	31	6	6
Egg	30	10	9	10	13

Table 3 presents the consumption frequency of various food items among respondents. Mutton was rarely consumed, with 48% eating it every 2-3 months, 09% weekly, and 11% never consuming it. Beef has a more regular intake, with 8% consuming it daily, 31% weekly, and only 3% never eating it. Organ meat was the least commonly consumed, with 22% eating it weekly, 28% rarely, and 30% never. Chicken was moderately consumed, with 26% weekly and 31% monthly. Eggs have the highest daily consumption at 30%, while 10% consume them weekly and 13% never eat them. Overall, while beef and eggs intakes were good the other meats were less common in the diet.

Table 4: Frequency of Seasonal Fruits within the sample

Food Items	Daily	Weekly	Monthly 2-3 Times	Rarely 2-3 Monthly	Never
	%	%	%	%	%
Water melon	0	34	49	14	3
Peach	0	37	35	20	6
Apples	2	8	52	5	10
Mango	2	29	47	9	5
Dates	6	35	26	16	13
Banana	3	18	41	17	5

The consumption patterns of various seasonal fruits among respondents (Table 4) showed watermelon was most commonly consumed monthly (49%), with 34% eating it weekly and only 3% never consuming it. Peach followed a similar pattern, with 37% consuming it weekly and 35% monthly. Apples were mainly eaten monthly (52%), but only 2% consume them daily, and 10% never eat them. Mango was also

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largely consumed monthly (47%) and weekly (29%). Dates are regularly consumed, with 6% eating them daily, 35% weekly, and 26% monthly. Bananas were mostly eaten monthly (41%), while 18% consume them weekly, and 3% eat them daily. Overall, the consumption of most seasonal fruits was weekly or monthly.

Table 5: Common Intake Patterns of Seasonal Vegetables

Food Items	Daily	Weekly	Monthly 2-3 Times	Rarely 2-3 Months	Never
	%	%	%	%	%
Spinach	0	10	46	2	5
Bitter gourd	0	15	40	3	13
Potato	10	47	84	1	7
Okra	0	48	67	0	0

The consumption frequency of various vegetables among respondents (Table 5) showed the intake of leafy vegetables (spinach) were primarily consumed monthly (46%), with 10% eating it weekly and 5% never consuming it. Bitter gourd follows a similar trend, with 40% eating it monthly, 15% weekly, and 13% never consuming it. Potatoes were the most frequently consumed, with 10% (as fries), 46% on weekly, and 84% eating them monthly. Okra was mostly consumed weekly (48%) and monthly (67%). Overall, most vegetables were eaten weekly, with potatoes and okra being the most consistently consumed.

Table 6: Intake Patterns of Grains, Cereals, and Beans of the Respondents

Food Items	Daily	weekly	Monthly 2-3 Times	Rarely 2-3 Months	Never
	%	%	%	%	%
Ultra-refined flour	54	18	20	2	2
All-purpose Wheat Flour	95	1	1	0	2
Brown bread	0	0	1	0	99
White bread	0	6	3	1	87
Porridge	0	0	0	0	100
Kidney beans	0	42	60	1	5
Chickpeas	0	26	33	4	6
Lentils	0	24	40	1	2
Chana dhal	0	11	41	0	1

The frequency consumption of grains, cereals, and beans among respondents (Table 6) showed that bakery flour (maida) was widely consumed, with 54% eating it daily and 20% never consuming it. All-purpose (semi-refined) wheat flour available in the local markets was a staple, with 95% consuming it daily and only 2% never eating it. Brawn bread, white bakery bread, and porridge were rarely consumed. Among legumes, kidney beans, chickpeas, lentils, and chana dhal were mostly consumed on weekly and monthly basis.

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Table 7: Mean Nutrient Intake Analysis of the Participants

Parameters	Interquartile Range	Mean ± Std. Deviation	P level *	P level **
Energy (Kcal)	1000- 2740	1931 ± 469.93	0.458	0.066
Fat (g)	40 - 122	76.78 ± 26.25	0.710	0.153
SFA (g)	18.6 - 24.2	6.782 ± 5.50	0.262	0.520
PUFA (g)	0.89 - 38.8	8.86 ± 8.10	0.446	0.504
Monos (g)	4.8 - 34.5	10.29 ± 7.98	0.198	0.551
Proteins (g)	28 - 56.6	33.82 ± 22.57	0.001	0.041
Carbohydrates (g)	190 - 254.4	119.74 ± 53.64	0.888	0.191
Sugars (g)	30 - 69.9	29.10 ± 15.05	0.679	0.071
Starch (g)	128 - 226.1	95.69 ± 46.89	0.839	0.215
Water (g)	361.8 - 1058.2	569.48 ± 215.65	0.358	0.008
Vitamin A (ug)	627 - 2304.0	312.66 ± 31.2	0.748	0.615
Thiamine (mg)	0.67 - 1.5	0.66 ± 0.31	0.376	0.412
Riboflavin (mg)	0.06 - 1.28	0.410 ± 0.24	0.034	0.367
Niacin (mg)	0.2 - 67.4	14.06 ± 9.55	0.00	0.046
Vitamin B6 (mg)	0.02 - 2.07	0.81 ± 0.44	0.029	0.057
Vitamin B12 (ug)	0.30- 4.4	0.73 ± 1.12	0.117	0.237
Folic acid (ug)	6.0 - 107	64.09 ± 11.12	0.172	0.674
Pantothenic acid (mg)	0.1 - 4.3	1.81 ± 1.19	0.001	0.020
Biotin (ug)	0.1 - 23	9 ± 7.63	0.681	0.096
Vitamin C (mg)	20.6 - 90.7	44.98 ± 43.56	0.003	0.270
Vitamin D (IU)	1990.8 - 3280.0	2635.4 ± 322.3	0.744	0.259
Vitamin E (mg)	0.02 - 17.30	8.18 ± 5.54	0.405	0.264
Calcium (mg)	362.3 - 850.0	307.94 ± 172.16	0.442	0.801
Sodium (mg)	2500 - 6630	5360 ± 692.26	0.269	0.534
Iron (mg)	6.82 - 18.0	7.10 ± 4.21	0.337	0.195
Zinc (mg)	0.2 - 13.6	4.65 ± 2.86	0.68	0.027
Copper (mg)	0.3 - 2.21	0.73 ± 0.41	0.463	0.336
Choline (mg)	0.62 - 491.0	97.84 ± 137.92	0.378	0.407

The nutrient intake of the sample great variations (Table 7) in energy, macronutrient, and micronutrient consumption. The maximum Vitamin D intake was 3280 IU, with a mean and standard deviation of 2635.4 ± 322.3. Fat intake ranged from 40 to 122 grams, with a mean of 76.78 ± 26.25, while water consumption averaged 569.48 ± 215.65 grams. Vitamin C intake was 24.98 ± 43.56 mg, and zinc consumption averaged 4.65 ± 2.86 mg. Folic acid intake varied widely, with a mean and SD of 64.09 ± 11.12 µg, whereas sodium intake was 5360 ± 692.26 mg. The data suggests that respondents had lower-than-recommended intakes for certain nutrients, which may be influenced by factors such as

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family dietary intake patterns, family income, personal preferences, and pregnancy pregnancy-induced poor food choices leading them to consume more affordable but less nutritious food. This aligns with findings from previous studies, which indicate that women in some regions tend to have lower micronutrient intakes, often relying on cereal-based diets with deficiencies in key nutrients like folate, iron, calcium, and zinc.

4. DISCUSSION

According to the WHO classification, the prevalence of anemia in pregnant women in this study area denotes a severe public health problem (Targets, 2025 and WHO 2001). A similar prevalence (81.8%) was reported in a study by Bansal et al. (2020). The prevalence of anemia in this study was less than another national study on anemia prevalence in pregnant women. The differences in the prevalence of anemia might be due to socioeconomic variations and differences in dietary habits across regions. Based on the international poverty line of US$1.90/person/d indicate that communities who live below the international poverty line are at high risk of developing malnutrition. Poverty is a marker for likely food insecurity and can prevent pregnant women from consuming adequate, good-quality, and nutritious food, which predisposes them to the risk of developing anemia. In this study, nearly 8% of pregnant women reported eating protein-dense foods such as meat every week, and some 36% reported having eaten it in the past 24 hours, which might not truly reflect their usual diet. A more typical diet of local people in this region of Pakistan consists of mainly bread and rice mixed with seasonally available vegetables or cereals and beans. Meat is eaten only occasionally due to its high cost and poor availability (Msuya, 2011). Another possible explanation for the observed prevalence of anemia in this study could be that the high consumption of sugared tea by pregnant women could reduce the bioavailability of iron from the foods they ate. We found that the education and wealth status of pregnant and non-pregnant women were associated with anemia. Women who were not educated and had secondary level education were more likely to have anemia compared to women with higher education. Education has a strong relationship with income and wealth. Individuals with better education tend to earn more income, and finishing at least a college degree equates to a better salary (Valletta, 2015). In addition, women with better education probably have better knowledge and health behavior, which in turn encourages them to adopt healthier lifestyles such as eating nutritious food, better health decision-making, and better hygienic habits (Valletta, 2015). We found in this study that a family size of five or more members increased the likelihood of pregnant women having anemia compared to women with < 5 family members. This finding is similar to studies in Ethiopia and Pakistan, wherein women with five or more family members had a two-fold increased risk of anemia (Geta et al , 2022 and Ullah et al , 2019).

We found that rural women were also more likely to have anemia compared with urban women. A similar result has been reported in previous studies from LMICs, including in Pakistan, Ethiopia, and Nigeria (Geta et al, 2022, Ullah et al, 2019, and Awoleye et al, 2022). Anemia may be more common in rural locations due to high rates of poverty, and inadequate access to healthy food and safe water, education, and basic medical services. This situation can also explain the increased likelihood of non-pregnant women with unimproved sources of drinking water having anemia. Poor drinking water source is a common problem in rural poor communities that resulted in several public health issues such as anemia (Inah et al, 2020). Previous investigations observed that unavailability and poor sources of water supply were found to be associated with anemia among reproductive-aged women in developing countries (Sunuwar et al 2020 and Gautam, 2019). Exposure to poor-quality water supply causes spread of parasitic infections such as malaria and schistosomiasis that are linked to prevalence of anemia (Pal et al, 2018, Adam,et al, 2021, Correa-Agudelo, E. et al, 2021, and Harding et al 2018). It is commonly known that schistosomiasis is a parasitic infection that causes persistent blood loss, which results in anemia (Hopenhayn et al, 2006 and Kile et al 2016). A study in Chile also found that drinking water contaminated with arsenic increased the risk of anemia in women (Hopenhayn et al, 2006). Arsenic is a chemical that is found in the groundwater system at a higher concentration,

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especially in shallow tube wells (Kile et al, 2006). Groundwater sources such as wells are commonly used as household water supplies in LMICs (Foster et al, 2021). Therefore, deworming in areas where parasitic infection is common, iron supplementation, and intervention in safe water sources and sanitation systems all play a crucial part in minimizing anemia and other nutritional losses brought about by water-borne infections (WHO, 2025).

The finding that women with inadequate dietary intakes patterns were more likely to have anemia supports the importance of pregnant women having access to a variety of foods during pregnancy. This helps to promote optimal nutrition during pregnancy for both the pregnant woman and her fetus. Women with inadequate dietary diversity often struggle to consume the necessary nutrients during pregnancy to support growth and development of fetus (Zhou et al, 2019)). Therefore, strategies to improve dietary diversity can increase nutrient adequacy, which can lead to a decrease in the prevalence of anemia during pregnancy. In other settings, dietary diversity scores have also been shown to reflect a pregnant woman's risk of anemia (Ayensu et al, 2020, Saaka and Rauf, 2015, and Lebsoet al 2017). Therefore, public health interventions that target strategies to improve dietary diversity in pregnant women can be significantly impactful to reduce anemia and associated comorbidities.

5. CONCLUSION

Anemia in reproductive-aged women is high in Pathan women, especially among pregnant women. It is necessary to promote dietary variety and the consumption of iron-rich foods for all reproductive-aged women. Nutrition-specific interventions and nutrition-sensitive interventions such as improving women's educational levels, promoting better reproductive health practices, ensuring access to high-quality maternal health care, dissemination of information about prevention and treatment of anemia through various mass media channels, and improving sanitation and access to safe water supply need to be ensured. This fight against anemia and other health indicators among the Pathan women can be significantly improved by providing women with sustainable economic opportunities as well. The results of the present study can provide a baseline reference for future investigation of anemia in women from this region.

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