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Minimum Dietary Diversity-Women Score, a Key Indicator of Micronutrient Adequacy and its Association with Iron Status among Pregnant Women: Evidence from a Hospital-Based Cross-Sectional Study

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Abstract

A diversified diet is crucial for micronutrient adequacy in a pregnant woman. Iron deficiency Anemia (IDA) is linked to a lack of diversity in diets. The Minimum Dietary Diversity-Women (MDD-W) is a global indicator developed by the FAO to assess diet quality among women of reproductive age. The study seeks to determine the prevalence of MDD scores and its association with sociodemographic factors and iron status among pregnant women. Hospital-based cross-sectional study was conducted among pregnant women at the women's hospital, Prayagraj, Uttar Pradesh using systematic sampling frame. An enumerator-administered semi-structured interview schedule was used. Hemoglobin levels were assessed and IDA categorized. The prevalence of anemia was 47.4%, of which only 18.1% of women consumed a diverse diet and 81.89% had low MDD-W scores. The mean hemoglobin was 10.82 g/dl, Standard deviation 1.58. Socioeconomic status showed significant correlation to anemia ($P = 0.001$), and an OR of 1.099 at 95% confidence interval. The high prevalence of IDA and low MDD-W scores proves the need for increased awareness on dietary diversity rates among pregnant women so that micronutrient adequacy can be achieved.

Keywords: Anemia, Dietary diversity, Minimum dietary diversity-women, Pregnancy

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Introduction

Anemia continues to plague the public health forefront of our nation and more so among the pregnant population. . The national prevalence of anaemia (Hb cut-off <11.0g/dl) among pregnant women aged between 15 and 49 years was 50.4 % as per the NFHS 4(2015-16) survey and 52.2% as per NFHS 5(2019-21). Of the 52.2% population, 45.7% were from Urban population and 54.3% from the rural population [1]. This high prevalence adversely affects the next generation and impacts the GDP and economic situation of our country. While genetic causes and infectious diseases contribute to anaemia, nutritional risk factors contribute the most [2]. Among the micronutrient deficiencies, deficiencies of iodine, calcium and iron have most impacted pregnant women. As these women are behind the dietary decisions at their households, it is important to check and encourage for dietary diversification in micronutrient deficiencies among pregnant women.

The study seeks to determine the prevalence of anemia and its association with dietary diversity scores among pregnant women. Throughout this paper, "MDD-W" will refer to Minimum Dietary Diversity Scores-Women. Dietary intakes calculated by various methods such as recall method, food dairy method, food frequency method, and weighment method do not adequately capture the micronutrient deficiencies. To counter this gap in dietary assessment, new indicators such as the MDD-Minimum Dietary Diversity have been used in large surveys. The indicator MDD was modified to MMD-W (Minimum Dietary Diversity Scores-Women). To accurately assess diet diversity and micronutrient adequacy of Women of Reproductive Age (WRA), it also accounts for the physiological demands which are an important dimension of the quality of the diet.

The Food and Agriculture Organization defines MDD-W as "*a dichotomous indicator of whether or not women 15–49 years of age have consumed at least five out of ten defined food groups the previous day or night.*"[3] The population-level indicator is a dichotomous indicator that is easier to interpret dietary diversity and quality.[4] This dietary diversity score is a population-level indicator, where the data collection is not household-level measures, but at individual level measures. The recall is from the 24 h before the survey. The indicator is associated with nutrient adequacy and has been validated and promoted by the WHO and USAID.

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Materials and Methods

The cross-sectional study is a hospital-based study conducted at pregnancy ward of Women's Hospital, Prayagraj, Uttar Pradesh. The sampling method included systematic sampling method until the sample size was met. A semi-structured interview schedule was used to collect data of subjects meeting inclusion criteria of age between 18 and 49 years. Sample size was collected using the formula $n = Z2\ p\ (1\text{-}p)/d2$.[5] and was calculated to

Table 1: ICMR, 2011 Classification for severity of anemia

Severity of anemia	*Hemoglobin (Hb (g/dl)*
Mild	10–10.9
Moderate	9.9–7
Severe	6.9–4
Very severe	<4

be 243 including non-response rate of 5%. Informed consent was collected from every study participant. Women who were lactating and non-pregnant were excluded from the study. Data were entered and cleaned using Microsoft Excel 2019 and imported into IBM Statistical Package for the Social Sciences SPSS V.20.0 for statistical analysis. The descriptive analysis and association between dependent and exploratory variables were analyzed using SPSS V.21. Anemia levels were assessed at hospital premises. The WHO and ICMR define anemia in pregnant women as hemoglobin <11 g/dl.[6] ICMR further classifies the severity of anemia [Table 1] as Mild, Moderate, Severe, and Very severe.

Maternal dietary intake was collected through 24-h recall method. The 24 h data capture normal dietary intake, the data were coded by the MDD-W list of food groups.

Variables

The dependent variable is dietary diversity: MDD-W score, the MMD-W score consists of ten pre-defined food groups, namely, (1) Grains, white roots and tubers, and plantains, (2) pulses (beans, peas, and lentils), (3) nuts and seeds, (4) dairy, (5) meat, poultry, and fish, (6) eggs, (7) dark green leafy vegetables, (8) other vitamin A-rich fruits and vegetables, (9) other vegetables, and (10) other fruits. The dichotomous indicator was used by assigning score of 1 to a participant that has consumed five or more than five food groups and a score of 0 to those that consumed <5 food groups from the pre-defined list. The independent variables are sociodemographic factors such as age, religion, family size, socioeconomic score using Kuppuswamy's socioeconomic scale,[7] and iron status: Iron deficiency Anemia levels.

Ethical Considerations

Ethical approval was obtained from Sam Higginbottom University of Agriculture, Technology and Sciences. Participant informed consent was obtained and confidentiality was assured.

Results

The Sociodemographic Characteristics

The mean age of the study participants was 25.12 ± 3.73 with a mean gestational age 19.54 ± 8.9. Sixty-seven participants were from first trimester, 123 and 53 participants from second and third trimester respectfully. The other characters are mentioned in Table 2.

Clinical Characteristics

Pregnancy characteristics

A mean gestational age of the study participants was 19.54 ± 8.9. 67; participants were from first trimester, 123 and 53 participants from second and third trimester respectfully.

Table 2: Distribution of participant's demographic characteristics

Determinants	*Categories*	*Frequency n*	*Percentage*
Age group	18–30	223	91.7
	31–49	20	8.23
Religion	Hindu	172	73.9
	Muslim	71	29.2
Family size	<5	151	62.1
	≥5	92	13.1
Educational qualification	Graduate	61	25.1
	High school	52	21.4
	Illiterate	52	12.35
	Intermediate/ diploma	30	15.23
	Middle school certificate	44	18.11
	Primary school certificate	3	1.23
	Professional or Honours	16	6.58
Socio economic level	Upper	4	1.64
	Upper middle	51	20.9
	Lower middle	89	36.6
	Upper lower	88	36.1
	Lower	11	4.5

Anemia characteristics

The prevalence of anemia among pregnant women as diagnosed by hemoglobin cut off values of 11 g/dl was found to be 47.3%. About 52.7% participants were non anemic [Figure 1]. Mean hemoglobin was 10.82 g/dl standard deviation 1.63 (95% CI: 10.61, 11.03).

Further, the classification of anemia according to ICMR 2011 of participants shows the prevalence of mild-to-moderate anemia to be 53% and 57%, respectively [Figure 2] with a mean hemoglobin of 10.82 g/dl in the study participants.

Dietary Diversity Scores

The Food and Agriculture Organization seeks to use the Minimum Dietary Diversity as a proxy indicator that is a dichotomous value. The population-based indicator is calculated using the given formula[4] which was found to be 18.1%.

Formula to calculate minimum dietary diversity:

$$\frac{\text{Women 15 – 49 years of age who consumed foods from 5 food groups during the previous day}}{\text{Total number of women 15 – 49 years of age surveyed}}$$

The percentages of women that are consuming five or more than five food groups were 18.1%. Those that consumed <5 food groups were 81.89%. One hundred and ninety-nine of the women surveyed did not consume a diverse diet [Figure 3]. Mean MDD score was 3.47 with an S.D of 1.11, (CI 95%: 3.32, 3.61).

Dietary Characteristics

The 24 h recall was coded into the ten predefined food group list. The distribution of the diet is shown in Figure 4. The diet consisted majorly of staple grains (99.17%) such as cereal and pulses (90.12%) followed by 58% of pregnant women consuming diverse group of vegetables. The least consumed food group was eggs reported to be 3.29%, 3.7% nuts and seeds, 11.11 % dark green leafy vegetables, and 11.93% of vitamin A-rich fruits and vegetables.

Table 3: Corelation between anemia and socioeconomic status

Corelation between anemia and Socioeconomic Status							
	SES Score					*Total*	*Correlation*
	I-upper	*II-upper middle*	*III-lower middle*	*IV-upper lower*	*V-lower*		
Anemic	0	27	29	52	7	115	χ^2=18.05 (*P*=0.001),
Non-anemic	4	24	60	36	4	128	OR 1.099 (CI 95%)
Total	4	51	89	88	11	243	

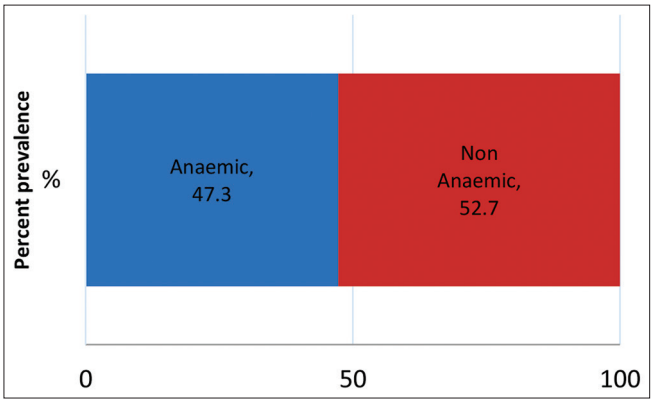

Figure 1: Prevalence of anemia among pregnant women

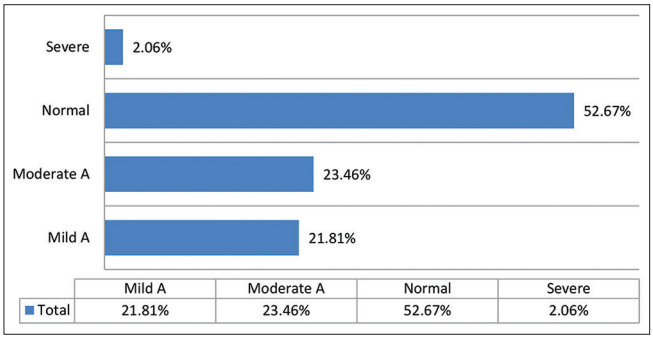

Figure 2: Distribution of classification of anemia among participants

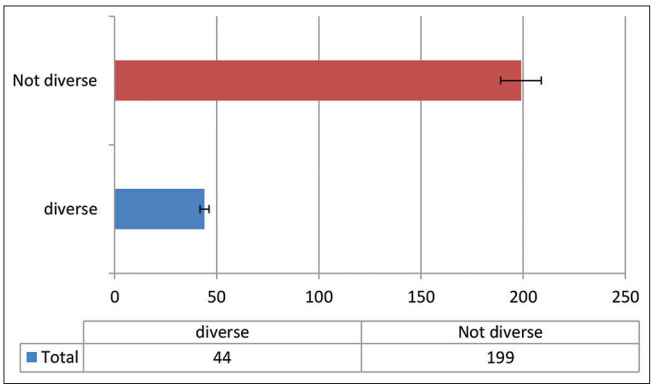

Figure 3: Count of participants having diverse and non-diverse MDD-W scores (Error bars indicate 95% Confidence Interval)

Number of Food Groups Consumed

The number of food groups consumed by study participants respectively was three groups by 38.2% participants followed by 25.1% eating four food groups. This shows that the variety among food groups consumed on a regular basis is low [Figure 5].

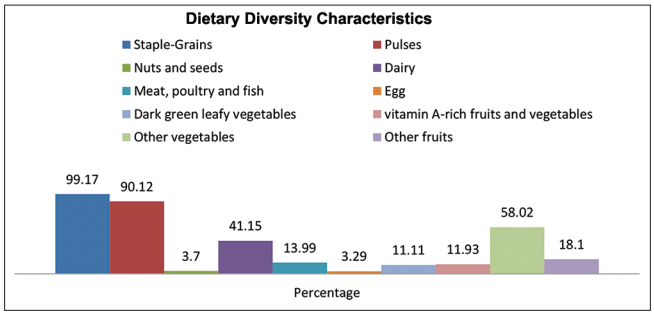

Figure 4: Dietary Diversity food group characteristics

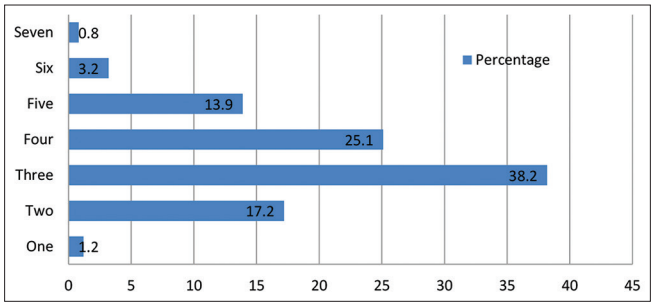

Figure 5: Number of food groups consumed by participants out of ten groups

Association between Anemia Status and Study Determinants among Participants

There were no significant associations among diversity score, religion, occupation, and education among the variables.

Association between Minimum Dietary Diversity Score (MDDS) and Study Determinants

With anemic population as target group, odds ratio with CI 95% was greater than 1 among family size (OR: 1), occupation (OR: 13), and education (1.026). There is significant association between the prevalence of anemia and socioeconomic status χ^2 = 18.05, *P* value = 0.001, and OR: 1.099 [Table 3].

Discussion

In households or areas consuming predominantly starchy foods, dietary diversity is an important indicator. The indicator has been validated by many studies on its association with micronutrient adequacy. The dietary intake on the whole had low diversity with low mean scores. The study had 18% of pregnant women achieving the mean MDD-W score. Relevant literature also reports low achievement. This study correlates with a recent study by Saaka *et al*. conducted in rural Ghana, that there is an association between dietary diversity and hematological status of pregnant women.[8] The percentage of

population having anemia was 47.3%, this correlated with recent national survey reports such as NFHS 4 and 5. NFHS 4[10] survey states that 49.3 % of pregnant women (aged 15–49 years) were anemic (Hb<11.0g/dl) and the recent NFHS 5[2] (Phase-1) data numbers indicate a total prevalence level of 45.7%. The dietary diversity was not associated with sociodemographic factors as well as iron status among pregnant women. However, there is an association between anemia and the socioeconomic status. The limitations of the study are recall bias of participants at dietary assessment.

Conclusion

High prevalence of iron deficiency anemia (IDA) (47.3 %) and low MDD-W scores (mean 3.47 ± 1.11, 18% achieving MMDW-S) proves the need for increased awareness on dietary diversity rates among pregnant women, especially those from lower economic SES so that micronutrient adequacy can be achieved. Significant targets to be achieved such as the Anemia-Mukt-Bharat and POSHAN Abhiyaan that has set the target in 2016 to reduce the prevalence from 50% to 32%–3% per annum by 2022 and SDG targets a set of six global nutrition targets for 2025, aiming to achieve a 50% reduction of anemia in women reproductive age which is the need of the hour. This as proved by this study and recent literature highlights the need for a diverse diet. The study proposes the following policy implications: To include nutritional awareness-focusing on diversity to decrease micronutrient malnutrition and include nutritional risk awareness to WRA and pregnant women's Ante-Natal Care package.

References

1. NFHS 5, International Institute for Population Sciences and ICF. National Family Health Survey (NFHS-5). India. Mumbai: International Institute for Population Sciences; 2021.
2. Bekele A, Tilahun M, Mekuria A. Prevalence of anemia and its associated factors among pregnant women attending antenatal care in health institutions of Arba Minch Town, Gamo Gofa Zone, Ethiopia: A cross-sectional study. Anemia 2016;2016:1073192.
3. FAO, 360 FHI. Minimum Dietary Diversity for Women: A Guide for Measurement. Rome: FAO, 360 FHI; 2016.
4. Project I. Data4Diets: Building Blocks for Diet-related Food Security Analysis. Tufts Univ Boston, MA: Project I; 2018. p. 1-160.
5. Charan J, Biswas T. How to calculate sample size for different study designs in medical research? Indian J Psychol Med 2013;35:121-6.
6. Tandon R, Jain A, Malhotra P. Management of iron deficiency anemia in pregnancy in India. Indian J Hematol Blood Transfus 2018;34:204-15.
7. Khairnar MR, Wadgave U, Shimpi PV. Kuppuswamy's socio-economic status scale: A revision of occupation and income criteria for 2016. Indian J Pediatr 2017;84:3-6.
8. Saaka M, Oladele J, Larbi A, Hoeschle-Zeledon I. Dietary diversity is not associated with haematological status of pregnant women resident in rural areas of Northern Ghana. J Nutr Metab 2017;2017:8497892.