

Prevalence of anemia among non-pregnant and pregnant women of reproductive age in Nepal

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ABSTRACT

Introduction: The prevalence of anaemia among pregnant women in developing countries is high. Iron deficiency is one of the major causes of nutritional anemia worldwide. In order to address the problem of anemia in Nepal, government of Nepal introduced the Iron Supplementation and Intensification Programs. The 2006 Nepal Demographic and Health Survey evaluated these programs and revealed the reduction in the prevalence of anemia among women of reproductive age. However, reduction on prevalence of anemia among the non-pregnant and pregnant women has not been studied separately so far. Thus, this study aims to explore the 2006 Nepal Demographic and Health Survey (NDHS) data to study the change in the prevalence of anemia among non-pregnant and pregnant women of reproductive age.

Methods: The data is taken from the 2006 Nepal Demographic and Health Survey (NDHS) which is a nationally representative survey of 10647 women of reproductive age or 15-49 years. Out of them 604 were pregnant at the time of the survey. Hemoglobin level is adjusted for the altitude and daily cigarettes smoking is used in this study. Using the adjusted hemoglobin level, anemia is classified into four categories i.e. severe, moderate, mild and any anemia.

Results: The prevalence of anemia among the non-pregnant reproductive age women is found to be 35.8%. The highest prevalence is observed for Far-Western terai (67.1%) followed by Mid-Western terai (59.4%), Central terai (55.5%) and Western terai (47.15%). Mean hemoglobin (Hb) level is found to be less than 12 g/dl at these regions. The prevalence of severe anemia among non-pregnant women of reproductive age at national and eco-development regions is less than 2%, moderate anemia is 5.6% and mild anemia is 29.8%.

The overall prevalence of anemia among the pregnant reproductive age women is found to be 42.7%. The highest prevalence is again observed for Far-Western terai (69.2%) followed by Central terai (55.2%) and Western terai (52.1%). The mean h level is less than 11 g/dl at Central, Western, Mid-Western and Far-Western terai regions. Prevalence of severe anemia among pregnant women of Western terai and Mid-western terai is found to be more than 2%. Furthermore, Mid-western hill and Central terai also has equal or more than 1.5% prevalence of severe anemia among pregnant women of reproductive age.

Conclusion: There are some eco-development regions where anemia prevalence was found to be less in the pregnant women than the non-pregnant women and vice-versa. This warrants an immediate intervention policies and programs from the governmental and non-governmental agencies. Even though Nepal has reduced the prevalence of anemia among non-pregnant and pregnant women of reproductive age, it is required needs to further decrease the anemia prevalence in order to reduce the maternal mortality in the country and meet the target 5a of MDG Goal 5 on maternal health.

Keywords: *anaemia, pregnancy*

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INTRODUCTION

Anemia is public health problem that affects populations in developing and developed countries. World Health Organization (WHO) estimates that around 1.75 billion people worldwide are affected by anemia, and the majority of them are from the developing countries¹. The prevalence of anemia among pregnant women in the was lowest in the Americas (24.1%) and Europe (25.1%) and highest in the Africa (57.1%) and South-East Asia (48.2%)². Among the non-pregnant women, 47.5% are anemic in the Africa followed by 45.7% in the South-East Asia while only 17.8% are anemic in the Americas and 19.0% in Europe². Anemia is caused due to multiple factors but iron deficiency account for at least 50% cause of nutritional anemia worldwide³. The main risk factors for Iron Deficiency Anemia (IDA) include low intake of iron, poor absorption of iron from diets high in phytate or phenolic compound, and period of life when iron requirements are especially high¹. Thus, two groups - pregnant women and young children - are mostly affected by anemia thought it can occur at any stage of life.

Nepal had the highest prevalence of anemia among the women of reproductive age^{2,3}. The 1998 Nepal Micronutrient Status Survey (NMSS) found a staggering 74.6% prevalence of anemia among the pregnant women⁴, which was later confirmed as the highest prevalence of anemia among the pregnant women in the world^{2,3}. This survey also revealed the prevalence of anemia among non-pregnant women as 66.7%, which was again highest in the world.

In order to address the problem of anemia in Nepal, National Strategy for the Control of Anemia among Women and Children was developed in 2002, which introduced the Iron Supplementation Program (ISP). It involved distribution of iron-folate supplements to pregnant women through health facilities⁵. National Nutrition Policy and Strategy (NNPS) mobilized Female Community Health Volunteers (FCHVs) to supply iron tablets to pregnant women at grass-root level through the Iron Intensification Program (IIP)⁶. Government of Nepal also integrated training on deworming of pregnant women into the existing Intensification of Maternal and Neonatal Micronutrient Program (IMNMP) due to the strong association of hookworm infestation during pregnancy anemia⁷.

The 2006 Nepal Demographic and Health Survey evaluated these programs and revealed the reduction in the prevalence of anemia among women of reproductive i.e. 36.2% in 2006 from 67.7% in 1998^{4,5}. However, reduction on prevalence of anemia among the non-pregnant and pregnant women has not been studied separately so far. Thus, this study aims to explore the 2006 Nepal Demographic and Health Survey (NDHS) data to study the change in the prevalence of anemia among non-pregnant and pregnant women of reproductive age residing in the 13 eco-development regions of the country.

METHODS

The data comes from the 2006 Nepal Demographic and Health Survey (NDHS) which is a nationally representative survey of 10647 women of reproductive age or 15-49 years. Out of them 604 were pregnant at the time of the survey. The NDHS 2006 used direct measurement of hemoglobin levels where HemoCue system was used for hemoglobin testing. This system consists of battery-operated photometer and a disposable microcuvette, coated with a dried reagent that serves as the blood-collection device. After obtaining written consent from each respondent, a drop of capillary blood taken from a person's fingertip or heel was drawn into the microcuvette. The blood in the microcuvette was analyzed using the photometer, which displayed the hemoglobin concentration⁸.

Hemoglobin level - adjusted for the altitude and daily cigarettes smoking - was used in this study⁹. Using the adjusted hemoglobin level, anemia is classified into four categories i.e. severe, moderate, mild and any anemia. Severe anemia is defined as hemoglobin count less than 7 grams per deciliter (g/dl) whereas moderate anemia is defined as hemoglobin count between 7.0 and 9.9 g/dl irrespective of pregnancy status. Mild anemia is defined as hemoglobin level between 10.0 and 11.9 g/dl among non-pregnant women and hemoglobin count between 10.0 and 10.9 among pregnant women. Any anemia, in this study, is defined as women having severe, moderate and mild anemia. Descriptive statistics, Analysis of Variance (ANOVA), Chi-Square test for Independence of Attributes are obtained using the SPSS Release 15.0.0¹⁰.

RESULTS

The 2006 NDHS results is representative geographically for the 13 eco-development regions of the country¹. Table 1 shows the mean hemoglobin level with standard deviation and distribution of anemia for these eco-development regions among non-pregnant women aged 15-49 years.

The overall prevalence of anemia among the non-pregnant reproductive age women is found to be 35.8%. At least one of the mean hemoglobin level across the eco-development regions are found to be different as the ANOVA is statistically significant. Also, as the chi-square test is highly significant statistically, it reveals that the prevalence of different type of anemia is dependent with the eco-development regions. This is further enforced by the results where mean Hb level is found to be less than 12 g/dl at Central, Western, Mid-Western and Far-Western terai regions and the prevalence of anemia is higher for these regions than others. The highest prevalence is observed for Far-Western terai (67.1%) followed by Mid-Western terai (59.4%), Central terai (55.5%) and Western terai (47.1%).

However, four regions – Central mountain, Eastern mountain, Central hill and Western hill - have less than 20% prevalence of anemia among the non-pregnant women of reproductive age. The prevalence of severe anemia among non-pregnant women of reproductive age at national and eco-development regions is less than 2%. However, prevalence of moderate anemia is 5.6% whereas prevalence of mild anemia is 29.8%.

Eco-Development Regions	Hb Level (g/dl)*			Distribution of Anemia**				Normal
	n	Mean	SD	Severe	Moderate	Mild	Any Anemia	
Eastern mountain	177	13.21	1.50	0.6%	2.3%	13.6%	16.4%	83.6%
Central mountain	193	13.29	1.28	0.0%	1.0%	12.9%	13.9%	86.1%
Western mountain ^a	333	12.59	1.57	0.6%	6.0%	22.2%	28.8%	71.2%
Eastern hill	600	13.07	1.48	-	2.5%	18.3%	20.8%	79.2%
Central hill	1596	13.17	1.51	0.3%	2.8%	15.7%	18.7%	81.3%
Western hill	1194	12.96	1.39	0.3%	3.9%	15.8%	19.9%	80.1%
Mid-western hill	594	12.82	1.45	0.2%	3.9%	17.2%	21.2%	78.8%
Far-western hill	309	12.92	1.54	0.3%	4.5%	17.5%	22.3%	77.7%
Eastern terai	1455	12.28	1.39	0.8%	3.4%	32.3%	36.5%	63.5%
Central terai	1480	11.67	1.49	0.8%	9.9%	44.8%	55.5%	44.5%
Western terai	730	11.98	1.40	0.3%	6.7%	40.1%	47.1%	52.9%
Mid-western terai	434	11.63	1.34	0.2%	9.7%	49.4%	59.4%	40.6%
Far-western terai	946	11.45	1.36	0.3%	10.9%	55.9%	67.1%	32.9%
National	10043	12.43	1.57	0.4%	5.6%	29.8%	35.8%	64.2%

* Fisher's test = 165.106, p-value = 0.000, ** Chi-square = 1389.409, p-value = 0.000

Table 2 reveals the mean hemoglobin level with standard deviation and distribution of anemia for the 13 eco-development regions of the country among pregnant women age 15-49 years. The overall prevalence of anemia among the pregnant reproductive age women is found to be 42.7%.

1 The western mountain represents western, mid-western and far-western mountains.

Table 2: Distribution of Mean Hb and Anemia among pregnant women aged 15-49 years, 2006, Nepal

Eco-Development Regions	Hb Level (g/dl)*			Distribution of Anemia*				Normal
	n	Mean	SD	Severe	Moderate	Mild	Any Anemia	
Eastern mountain	11	12.00	1.57	-	9.1%	18.2%	27.3%	72.7%
Central mountain	7	11.90	1.17	-	12.5%	12.5%	25.0%	75.0%
Western mountain	24	12.03	1.56	-	8.3%	8.3%	16.7%	83.3%
Eastern hill	26	11.17	1.68	-	23.1%	11.5%	34.6%	65.4%
Central hill	77	11.76	1.49	-	11.7%	20.8%	32.5%	67.5%
Western hill	65	11.34	1.47	-	20.0%	20.0%	40.0%	60.0%
Mid-western hill	55	11.73	1.49	1.8%	10.5%	21.1%	33.3%	66.7%
Far-western hill	27	12.05	1.43	-	7.1%	14.3%	21.4%	78.6%
Eastern terai	73	11.18	1.24	-	17.8%	27.4%	45.2%	54.8%
Central terai	134	10.57	1.58	1.5%	29.1%	24.6%	55.2%	44.8%
Western terai	47	10.93	1.58	2.1%	18.8%	31.3%	52.1%	47.9%
Mid-western terai	19	10.90	1.69	5.3%	5.3%	26.3%	36.8%	63.2%
Far-western terai	39	10.46	0.96	-	38.5%	30.8%	69.2%	30.8%
Total	604	11.21	1.55	0.8%	19.2%	22.7%	42.7%	57.3%

* Fisher's test = 6.409, p-value = 0.000 ** Chi-square = 62.238, p-value = 0.004

At least one of the mean hemoglobin level across the eco-development regions are found to be different as the ANOVA is statistically significant. Further, as the chi-square test is highly significant statistically, it reveals that the prevalence of different types of anemia is dependent with the eco-development regions for pregnant women as well. In addition, as the mean Hb level is less than 11 g/dl at Central, Western, Mid-Western and Far-Western terai regions, the prevalence is higher for these regions than others. The highest prevalence is again observed for Far-Western terai (69.2%) followed by Central terai (55.2%) and Western terai (52.1%). There are two other regions – Eastern terai and Western hill - with equal or more than 40% prevalence of anemia among the pregnant women. Only one region – Western mountain - has less than 20% prevalence of anemia among the pregnant women of reproductive age.

Prevalence of severe anemia among pregnant women of Western terai and Mid-western terai is found to be more than 2%. Furthermore, Mid-western hill and Central terai also has equal or more than 1.5% prevalence of severe anemia among pregnant women of reproductive age. Compared to the non-pregnant women (Table 1), there is a huge surge in prevalence of moderate anemia (19.2%) but reduction in mild anemia (22.7%) among the pregnant women.

DISCUSSION

Anemia remains to be the moderate public health problem in Nepal despite its prevalence decreased from 66.7% to 35.8% among non-pregnant women and from 74.6% to 42.7% among pregnant women between 1998 and 2006^{2,4,5}. Three terai regions – Far western terai, Western terai, and Central terai – has anemia prevalence greater than 40% indicating severe public health problem for non-pregnant as well as pregnant women of reproductive age for these regions^{2,3}. This warrants immediate interventions from the government and non-government institutions to reduce the prevalence of anemia among non-pregnant and pregnant women of reproductive age in these regions. Anemia

prevalence in the Mid-Western terai is found to be higher (59.4%) for non-pregnant and lower (36.8%) for pregnant women whereas it is found to be lower (19.9%) for non-pregnant and higher (40.0) for pregnant women in Western hill. Likewise, anemia prevalence in Eastern terai is found to be lower (36.5%) for non-pregnant and higher (45.2%) for pregnant women. On the other hand, anemia prevalence is found to be higher (20 – 39%) among pregnant and lower among non-pregnant women (5 – 19.9%) in Central hill, Eastern mountain and Central mountain. These are very interesting and important findings as they hold clues to reduce anemia from severe to moderate and moderate to mild public health problem which in turn require further in-depth research in the mentioned regions.

Prevalence of severe anemia among pregnant women of Western terai and Mid-western terai is found to be more than 2%, which is considered as the major public health problem^{2,3}. As these regions showed high prevalence of anemia, they need immediate attention. Furthermore, Mid-western hill and Central terai also had equal or more than 1.5% prevalence of severe anemia among pregnant women of reproductive age and warrant instant interventions from the government as well as non-governmental agencies. As the prevalence of moderate anemia was found to be higher among the pregnant women than non-pregnant women, specific and targeted program should be launched to decrease the moderate anemia among the pregnant women in order to save their lives during the childbearing and child birth.

These results clearly shows that anemia is widespread among the women of reproductive age in the country as none of the region are in the normal public health significance level i.e. anemia prevalence less than 5%². As the qualities of life of the women residing in these regions are compromised because of the anemia, they need immediate and appropriate interventions programs. There exists relationship between anemia and maternal mortality and recent study found prevalence of moderate to severe level of anemia explaining 38.0% of variation in the Maternal Mortality Ratio and 16.3% % variation in the Maternal Mortality Rate in Nepalese population¹¹. The 2006 NDHS revealed the moderate public health problem of anemia among various socio-economic factors like urban place of residence, SLC and above education, high wealth quintiles, age, parity and Body Mass Index (BMI)⁵.

Thus, Nepal could meet the Millennium Development Goal 5 on Maternal Health and particularly Target 5a on reduction of Maternal Mortality Ratio by three quarter if and only if the prevalence of anemia among the non-pregnant and pregnant women of reproductive age is reduced to less than 20% across eco-development regions of the country.

CONCLUSION

Anemia remains the public health problem among the non-pregnant and pregnant women of reproductive health in Nepal. Even though the prevalence of mild, moderate and severe anemia has reduced in the national level, it is still high in the three out of five eco-developmental terai regions. This warrants an immediate intervention policies and programs from the governmental and non-governmental agencies. There are some eco-development regions where anemia prevalence was found to be less in the pregnant women than the non-pregnant women and vice-versa. This gives ample opportunities for the researchers to explore the issues and find the factors responsible for bringing anemia prevalence below 20%. As anemia is found to be prevalent even in the women residing in the urban areas, belonging to the affluent class and with high education and normal BMI, the psycho-social factors need to be identified in order to further decrease prevalence of anemia and in turn the maternal mortality in the country and meet the target 5a of MDG Goal 5 on maternal health.

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