

# Anemia in Pregnancy—Consequences and Challenges: A Review of Literature

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## ABSTRACT

Anemia during pregnancy is a global public health challenge facing the world today, especially in the developing countries. Anemia in pregnancy is an important contributor to maternal mortality/morbidity as well as to the low birth weight which in turn might contribute to increased percentage for infant mortality. Many epidemiological studies in the past have reported the problem in high magnitude. This review was conducted to identify the persistence of the problem in the South Asian countries during the last 5 years irrespective of iron supplementation as a measure to tackle this problem.

**Materials and methods:** A review of all published literature related to prevalence of anemia for a period of 5 years (2007-2011) in South Asian countries was carried out. The online databases MEDLINE, CINAHL, Science Direct, Scopus, and Cochrane were used to identify relevant studies. Data from studies meeting inclusion/exclusion criteria were abstracted into a standardized form.

**Results:** Eleven studies with a total of 1,93,131 pregnant women were included in the review. The maximum and minimum reported prevalence rates of anemia during pregnancy were 80 and 18% respectively. The maximum and minimum prevalence of severe anemia affecting pregnant women is 20 and 2.7%. The risk factors that are involved are young age, educational status and socioeconomic status, poor birth spacing and lack of compliance to iron and folic acid supplementation.

**Conclusion:** Anemia is the most frequent maternal complication of pregnancy. All the 11 studies reviewed focused on assessing the prevalence of anemia during various stages of pregnancy. It shows anemia is prevalent from mild to severe degree with substantial variations across trimesters. The outcomes of these suggest prevalence of anemia is due to associated factors and lack of deficiency of vitamin B<sub>12</sub>, low BMI, infection with ascariasis, deficient dietary consumption of foods fortified with iron, low socioeconomic conditions and high parity.

**Keywords:** Anemia, Southeast Asia, Pregnancy, Prevalence, Hemoglobin, Mortality, Morbidity.

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## INTRODUCTION

South Asian countries representing Quarter of the World's population with 1.5 billion people are faced with formidable health challenge of which anemia is still a persistent one. Anemia in pregnancy is one of the most common and widespread public health problems affecting 24.8% of the

population in the world today.<sup>7,11,33</sup> The highest proportions of individuals affected are in Africa and in Southeast Asia (WHO 2008). Among the South Asian countries, WHO estimate that India has the highest prevalence of anemia in pregnancy. Prevalence of anemia in pregnant Indian women is 49.7%, against the global prevalence of 41.8% (WHO 2008). In Asia, anemia (irrespective of severity) is the second leading cause of maternal death and accounts for 12.8% of maternal deaths independent of death due to postpartum hemorrhage.<sup>14,23</sup> India contributes to about 80% of the maternal deaths due to anemia in South Asia<sup>10</sup> (Table 1). The prevalence of anemia in Bangladesh was 50% reported estimates from nationwide survey.<sup>34</sup> The multicenter, cross-sectional observational study conducted by Hanif et al (2007) in Malaysia reported the overall prevalence to be 35%. The main factors contributed were young age, grand multiparity and ethnicity.<sup>11</sup> In Indonesia, the prevalence of anemia based on scattered surveys was in between 50 and 70%.<sup>9</sup> According to the demographic health survey report of Sri Lanka (2006/07), the prevalence of anemia was 20.7% (mild) and moderate to severe was 13.3%. The overall prevalence was 34%.<sup>8</sup> In Bhutan, the prevalence was found to be 50%.<sup>8</sup> According to the health nutrition and population statistics, the prevalence of anemia among pregnant women ranged from 21.4% in Iran, 55.4% in Maldives (2001), 42.4% in Nepal (2006) and 39.1% in Pakistan (2001).<sup>8</sup>

Iron deficiency anemia is the most common and widespread nutritional deficiency in the world. The studies carried out in South Asian countries have shown that iron deficiency is the major cause of anemia. Recently, identified more than 70% of the pregnant women have vitamin B<sub>12</sub> deficiency compared to international guidelines.<sup>32</sup> In India, the prevalence of anemia is high because of fewer intakes of iron, folic acid and food sources that prevent iron absorption, coupled with poor bioavailability of iron is the major factor responsible for prevalence of anemia.<sup>29</sup> More than iron deficiency, zinc,

**Table 1:** Prevalence of anemia and its contribution to maternal mortality

Country	Prevalence of anemia in pregnant women (%)	Maternal deaths from anemia
Afghanistan	—	—
Bangladesh	74	2800
Bhutan	68	<100
India	87	22,000
Nepal	63	760
S. Asia region (total)	—	25,560
World total	—	50,000

Source: Health Nutrition and Population  
<http://siteresources.worldbank.org>

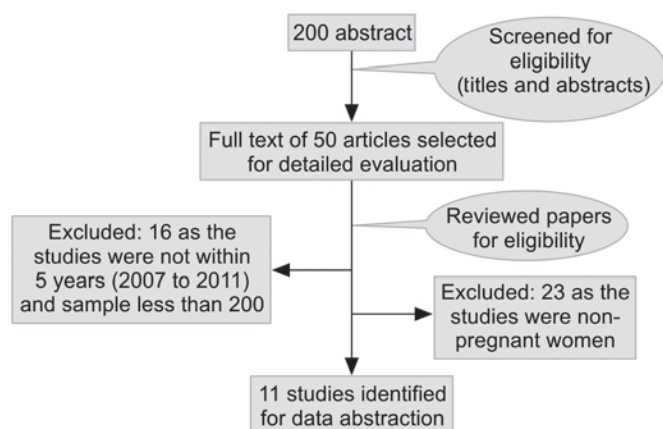
Table 2: Detailed characteristics of 11 articles included in the review

S. no.	Author	Study purpose	Participant (sample size)	Method	Setting	Instruments (tool)	Findings
1.	Patra, Puri, Trivedi and Pasrija, 2010	Prospective study was undertaken in order to study and critically analyze the socio-demographic and clinical profile of severely anemic pregnant women presenting in the last trimester of pregnancy.	Antenatal mothers in their third trimester (13,789)	Prospective study	Lady Hardinge Medical College and SK Hospital, New Delhi, India	Questionnaire and Hb level	The overall prevalence of anemia was 56.9 and 2.7% presented with severe anemia.
2.	Sharma, Patnaik, Garg and Prema, 2008	To assess anemia, identifying with moderate anemia (Hb between 5.0-7.9 gm/dl) Administering IM therapy (900 mg of elemental iron as iron sorbitol citric acid) to them in the OPD and observing the impact on maternal Hb levels and birth weight of the infant.	3,698 pregnant women attending antenatal clinic of urban primary health institution in Delhi, India.	Descriptive study	Urban Primary Health Institution in Delhi.	Questionnaire and Hb level	80% of 3,698 women were anemic 754 (20.1%) had Hb between 5.0 and 7.9 gm/dl. The mean Hb 9 weeks after completion of therapy was only 9.6 gm/dl. Mean birth weight in 3,40 women who completed the treatment was 2.8 kg significantly ( $p < 0.001$ ) higher than birth weight in women who had Hb $< 8.0$ gm/dl at the time of delivery.
3.	Rohilla, Raveendran, Dhaliwal and Chopra, 2010	To determine the maternal and perinatal outcome in patients with severe anemia in pregnancy.	4,456 women	Retrospective study	A tertiary hospital, northern India.	Review Health Record (hospital data) Hb by Sahli's method	798 (17.9%) found to be anemic, out of them 96 women had severe anemia; the remaining 702 (15.75%) women had mild to moderate anemia. Of the 96 severely anemic women, six died after admission.
4.	IjazUI Sohail, Ahsanullah, and Zara, 2011	To see frequency of anemia and its related risk factors in pregnant women in an under developed area of southern, Punjab, Pakistan	250 antenatal women	Descriptive study	Antenatal OPD, Tehsil Headquarter Hospital, Kabinwala, Pakistan	Questionnaire and Hb level	138 (55.25) were anemic. 83 (60.145) were moderately anemic, 55 (39.865) had mild anemic. None had severe anemia. Out of 250 antenatal women 108 women were not taking any iron supplement.
5.	Liabsuetrakul T, Chaikongkeit P, Korwiattananagarn S, et al. 2011	To determine the effect of international or Asian criteria-based body mass index (BMI) in predicting maternal anemia, low birth weight (LBW), and preterm births among pregnant Thai women and the change in hemoglobin (Hb) level during pregnancy	1,192 pregnant women	Observational study	In four south most provinces of Thailand	Questionnaire and Hb level	Overweight and obese women at pre-pregnancy by the Asian criteria-based BMI had a lower prevalence of anemia. The Hb levels did not change significantly over time. In addition to BMI, maternal age, parity and late prenatal visit were independently associated with maternal anemia, low birth weight, and preterm birth.
6.	Sukrat B, Suwathanapise P, Siritawe S, Pongthong T, Phupongpikul K, 2010	To determine the prevalence of iron deficiency anemia in pregnant women and the prevalence of thalassemia in both the anemic and nonanemic group	519 pregnant women	Screening for thalassemia and anemia	Thailand	At the first antenatal visit, blood was obtained for complete blood count	The WHO criteria (hemoglobin $< 11$ gm/dl) gave the highest prevalence of anemia and iron deficiency anemia during pregnancy (14.1% and 6.0%). The prevalence of thalassemia in the anemic group (39.7%) was higher than non-anemic group (24.4%).

Contd.

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7.	Dibley MJ, Titalley CR, d'Este C, Agho K, 2011	The study determined whether live born children <5 years of age born to mothers who used antenatal iron-folic acid supplements had reduced risk of death	Children <5 years from 52,917 singleton live-born infants, 1,525 deaths of children <5 years of age were examined the use of iron-folic acid supplements and child death in cumulative and 4 mutually exclusive time periods	Retrospective study	Indonesia	Review health record (review of demographic and health survey data to examine the relation between the use of iron-folic acid supplements and child death in cumulative and 4 mutually exclusive time periods) The sampling frame for the clinics was obtained from the National Medicine Use Survey (NMUS) of the Ministry of Health. Population were obtained from the National Population and Housing Census of 2000.	Reduction of risk of death (34%) of children <5 years of age were identified in those mothers consumed iron-folic acid supplements. There was a strong dose response of greater protection from death of children <5 years of age with increasing numbers of iron-folic acid supplements consumed.
8.	Haniff J, Das A, Onn LT, Sun CW, Nordin NM, et al 2007	To assess the prevalence of anemia	1,072 antenatal mothers from 56 clinics	Multicenter, cross-sectional survey	59 Ministry of Health (MOH), primary health care clinics in Malaysia	The overall prevalence of anemia in pregnancy is 35% and the majority of them were of the mild type (9-11 gm/dl), there seems to be no significant association between Hb levels and age group, education level, social class, urban rural residence, gravida and parity. Only two factors remained positively associated with anemia, i.e. gestational age and ethnicity.	
9.	Zhang Q, Li Z, Ananth CV, 2009	To explore the epidemiology and risk factors of anemia during pregnancy	1,64,667 women from 13 counties in East China	A prospective cohort study	Population-based pregnancy monitoring system in 13 counties in East China were women delivered singleton pregnancy at 20 to 44 weeks with at least one hemoglobin assessment during pregnancy were included.	The overall prevalence of anemia was 32.6% with substantial variations across trimesters (11.2, 20.1 and 26.2 % in the first, second and third trimesters). Risk factors for anemia included older maternal age, education below junior high school, farming occupation.	
10.	Baig-Ansari et al 2008	To determine the prevalence of anemia and the dietary and socioeconomic factors associated with anemia	Sample size 1,369	Prospective observational study	Urban community setting in Hyderabad, Pakistan. Pregnant women enrolled at 20 to 26 weeks of gestation	A blood sample was obtained at enrollment to determine the hemoglobin levels. Information on nutritional knowledge, attitudes and practice and dietary intake before and during pregnancy is obtained by trained interviewers	As per the criteria of WHO, the prevalence was 75% had mild anemia, 14.8% had moderate anemia and 0.7% had severe anemia. Anemia was related to food consumption high in phytoates, tea consumption and low intake of eggs and red meat.
11.	Lindstorm et al 2011	To study the prevalence of anemia and the determinants in early pregnancy	A sample of 2,119 pregnant women from a subdistrict in rural Bangladesh	Baseline data from a population-based randomized trial	The study was conducted in Matlab, A subdistrict in rural Bangladesh	Data was collected using Questionnaire, physical examination and laboratory analyses of blood samples	Anemia was present in 28% of the pregnant women, 55% were zinc deficient and 46% were vitamin B <sub>12</sub> deficient. The main reason attributed was related to ascariasis infestation. Poor nutritional status reflected by Low BMI was found to be associated with anemia



**Flow Chart 1:** The literature search

vitamin B<sub>12</sub> and folate deficiency was highly prevalent due to ascariasis infestation.<sup>25</sup> A study in rural Bangladesh found the increased prevalence of anemia was related to vitamin B<sub>12</sub> and zinc deficiency.<sup>16,35</sup> Moreover, poor nutritional status affected by low body mass index (BMI) in the women was found to be associated with anemia,<sup>15</sup> which necessitates intervention by health care providers in order to prevent complications that might arise as a result of these dietary inadequacies. The other contributing factors are young age, grand multiparity and ethnicity.<sup>15</sup>

The other causes of iron deficiency are: Insufficient quantity of iron-rich foods and 'iron enhancers' in the diet (foods rich in vitamin C, such as citrus fruits) and low bioavailability of dietary iron, excessive quantity of 'iron inhibitors' in diet, especially during mealtimes (e.g. tea, coffee; calcium-rich foods), iron loss during menstruation, poor iron stores from infancy and childhood deficiencies, iron loss from postpartum hemorrhage, increased iron requirement due to tissue, blood and energy requirements during pregnancy and, in some areas, due to heavy workloads, teenage pregnancy, repeated pregnancies with less than 2 years' interval, iron loss due to parasite load (e.g. malaria, intestinal worms), poor environmental sanitation, unsafe drinking water and inadequate personal hygiene.<sup>4,27</sup>

The major consequences of anemia in pregnancy are maternal mortality and morbidity as well as low birth weight leading to increased infant mortality.<sup>2,28</sup> Indeed, it is a known risk factor for many maternal and fetal complications. Maternal risks during antenatal period are poor weight gain, preterm labors, PIH, placenta previa, accidental hemorrhage, eclampsia, premature rupture of membrane (PROM). Maternal risks during intra and postnatal period are postnatal sepsis, subinvolution, embolism. Fetal and neonatal risks include prematurity, low birth weight, poor Apgar score, fetal distress, neonatal distress requiring prolonged resuscitation and neonatal anemia due to poor reserve. Infants with anemia have higher prevalence of failure to thrive, poorer intellectual developmental milestones, and higher rates of morbidities and neonatal mortalities than infants without anemia. Moreover, babies whose mothers had AIP during their first trimester *in utero* experienced higher rates of cardiovascular morbidities and mortalities in their adult lives than babies whose mothers did not have AIP.<sup>18</sup>

To tackle the problem of increased maternal mortality in the developing world international agencies and leaders from 45 countries established the safe motherhood initiative in 1987, with the goal of reducing half of maternal deaths by the year 2000 (World Bank 1993). However, the maternal death due to postpartum hemorrhage is still a leading factor. Despite these consequences, anemia continues to be a major challenge. There is little attention given at global and country levels to tackle this and, even after a decade, deaths due to hemorrhage indirectly related to anemia still remains the same. Maternal anemia control programs are the primary maternal nutrition program worldwide, but these programs are not well-funded and have therefore failed to significantly reduce maternal anemia in developing countries.

Therefore, the objectives of this paper were to review the current status of anemia in pregnancy in South Asian countries and to discuss the challenges faced by these countries in tackling the burden of anemia. The paper aims to address the following research question:

1. What is the current situation of anemia in pregnancy in South Asian countries?
2. Why does the problem still exist in spite of various nationwide anemia eradication programs?
3. What are the challenges faced by the country to overcome anemia in pregnancy?

## MATERIALS AND METHODS

### Data Sources and Search Strategy

An electronic literature search of the MEDLINE, CINAHL, Science Direct, Scopus, and Google scholar was carried out to identify relevant studies related to prevalence of anemia for a period of 2007 to 2011. The demographic and reproductive health survey reports available online were also retrieved. The medical subject handling terms (MeSH) and free text terms, such as anemia, prevalence, pregnant women, Southeast Asia, hemoglobin, risk factors were used to search.

### Inclusion Criteria

We identified studies from the peer-reviewed journals that used descriptive, cross-sectional and comparative research methodologies. The studies were limited to publication in the recent 5 years related to prevalence and consequences of anemia in South Asia. Both retrospective and prospective clinical studies were included. Studies with small group (less than 200 women) were excluded. All the studies were reviewed by all the authors. And, the studies that met the inclusion criteria were finalized and included for review. Out of 200 articles 11 potentially relevant articles were retrieved (Flow Chart 1). All the studies were focused on laboratory results (Hb). In all these studies, anemia was classified according to the World Health Organization (WHO) classification for pregnant women, i.e. below 11 gm/dl. Mild anemia was classified as hemoglobin concentration of 9.0 to 10.9 gm/dl, moderate anemia as 7 to 8.9 gm/dl and severe anemia as hemoglobin below 7 gm/dl.



## RESULTS

After assessing the quality of the full texts of potentially relevant studies, 11 studies with a total of 1,93,131 pregnant women were included in the review. The review included only clinical studies in which three from India, two from Pakistan, one from Indonesia, two from Thailand, one from Bangladesh, one from China and one from Malaysia. The detailed information of the included studies has been shown in Table 2. In all studies, prevalence estimated anemia ranged from 18 to 80%, and the prevalence of severe anemia ranged from 2.7 to 20% and, for the severe anemia, their Hb level was 5.0 to 7.9 gm/dl.<sup>18,26</sup> A study done in India through a retrospective approach, 4,456 women's hospital record were reviewed and the result shows that 17.9% (798) of them were anemic, out of this 2.15% (96) of them were found to be severely anemic and six out of 96 women died due to severe anemia.<sup>21</sup> The causes of death were atonic postpartum hemorrhage leading to multiorgan dysfunction, cardiac arrest in the second stage of labor and blood transfusion reaction.

The population-based prospective cohort study done in China covering a population of 1,64,667 women from the 13 counties with hemoglobin cut off <10 gm/dl as per Chinese standard found the prevalence as 69%.<sup>36</sup> The main reasons identified were older maternal age; low education and farming occupation were associated with an increased risk for anemia.<sup>36</sup> A prospective observational study of 1,369 pregnant women enrolled at 20 to 26 weeks of gestation have reported that 75% had mild anemia (9–10.9 gm/dl), 14.8% had moderate anemia (7–8.9 gm/dl) and only 0.7% had severe anemia (below 7 gm/dl). The major risk factors identified were increased consumption of tea, high pyrate containing food that interferes with iron absorption.<sup>3</sup>

A study done in Pakistan reported that 138 (55%) out of 250 women were anemic, in that 83 (60%) were moderately anemic, 55(40%) had mild anemia.<sup>12</sup> A study done in Indonesia through a retrospective approach to determine whether live-born children under 5 years of age born to mothers who used antenatal iron-folic acid supplements had reduced risk of death, and the result show that reduction of risk of death (34%) of children under 5 of age were identified in those mothers consumed iron-folic acid supplements.<sup>9</sup> An observational study done in Thailand with 1,192 women, the result showed that maternal age, parity and late prenatal visit were independently associated with maternal anemia, low birth weight and preterm birth.<sup>15</sup> And, another study shows that prevalence of anemia in Thailand by 14%.<sup>30</sup> The Malaysian study showed that the overall prevalence of anemia in pregnancy is 35%.<sup>11</sup> Studies done in India have identified that noncompliance due to side effects of iron and folic acid supplementation has brought the challenge to improve the counseling and support services.<sup>26</sup> The reports from the national surveys in South Asian countries indicate that women's education and standard of living in the households have a vital role in reducing anemia.

A study done in China reported that preconception folic acid supplementations was associated with reduced risk of anemia in the 1st trimester.<sup>36</sup> The challenge was to continue initiating prenatal care in the 2nd and 3rd trimesters which are associated with increased risk of anemia.

## DISCUSSION

Even after decades of implementing anemia control program in various countries, the magnitude of problem remains the same. The current literature focuses less on anemia since it is a chronic problem and no significant changes have been seen with iron and folic acid supplementation. Severe anemia in pregnancy is believed to increase the risk of maternal mortality in childbirth. In this review, we tried to assess the prevalence of anemia in South Asian pregnant women by analyzing the available studies from 2007 to 2011. The overall prevalence of anemia ranged from 18 to 80%, and the prevalence of severe anemia ranged from 2.7 to 20%. The result of our review shows that in India the highest prevalence of anemia in pregnant women is 80% when we compare with the study which is done in (1997) and (1999) the prevalence after a 10 years' time has reduced only from 87.6 to 80%.<sup>24,13</sup> Our review suggests that maternal age, parity and late prenatal visit were independently associated with maternal anemia, low birth weight and preterm birth, which is consistent with earlier studies.<sup>1</sup> A study result in India shows that out of 4,456 antenatal women 17.9% (798) of them were anemic, out of which 2.15% (96) of them were found to be severely anemic and six out of 96 women died due to severe anemia.<sup>21</sup> In a study on prevalence of anemia in Pakistan, the report shows 96% of pregnant population of Multan area in Pakistan were anemic.<sup>17</sup> Microcytic hypochromic anemia resulting from iron deficiency is the most frequent form of anemia (76%), followed by folate deficiency 20 (%) and combined iron and folate deficiency 20%.<sup>20,25</sup> The study discussed on prepregnancy, body mass index also was consistent with those of previous studies that reported that underweight women were at increased risk of anemia.<sup>5</sup> The prevalence of anemia observed in this reviews were very significant and consistent with data observed elsewhere in developing countries.

Definitely, the literature gives strong evidence that RCT trials have proven the iron supplementation helps in reducing the incidence of anemia during pregnancy. However, more efficacy treatments required to determine the conduct of intervention in developing countries, and see whether women are compliant to the routine supplementation and dietary modifications. The review shows that Thailand and Nicaragua were successful in reducing the prevalence of anemia according to the data from anemia surveillance program. The main focus was preventing anemia through iron supplementation, deworming, food fortification, follow-up dietary counseling and moreover a behavior change program with extensive training for community health workers.<sup>23</sup>

## MAJOR CHALLENGES FACED

Improving the quality of maternal and other related reproductive health services is a major programmatic challenge in resource-poor countries. All South Asian countries have programs to combat anemia in pregnancy. India was the first developing country to take up the national nutritional prophylaxis program among the South Asian countries of iron folic acid supplementation to prevent anemia among pregnant women

and children. Screening for anemia and iron-folate therapy in appropriate doses and route of administration for the prevention and management of anemia in these vulnerable groups has been incorporated as an essential component of antenatal care and pediatric practice.<sup>6</sup> In spite of all these programs the countries still face a challenge to tackle this problem. The reason could be failure to monitor and evaluate the supplementation of the program. The countries which could strictly monitor and evaluate have shown decline in the prevalence of anemia.<sup>22</sup> Moreover, countries who adopted the strategies to bring about a behavioral change through effective information counseling sessions have shown successful decline. In highly populated country like India, this has not gained momentum and the health sector has given importance to other emerging health problems, hence anemia has remained a silent disease affecting women and children of reproductive age.

The etiology of iron deficiency anemia has not changed over the decades. Apart from early marriage, repeated pregnancies, poor dietary habits, poverty and illiteracy are all factors which affect its incidence and severity. Dr SV Subramanian, Professor of Population Health and Geography, Harvard University, and one of the lead researcher expressed that the 'India continues to have severe anemia burden'. This emphasis highlights that social patterning of anemia by socio-economic status and education in several low-income and middle-income countries, including India.<sup>31</sup> The scenario from the literature searched for the last 5 years have shown no progress in achieving the goals set. Although some progress has been made, much more needs to be done to develop technical expertise and capacity, establish quality standards provide adequate supplies and equipment, train staff members, and provide continuous supervision. A great deal more needs to be done to improve client-provider interactions; to provide appropriate information, education and counseling; and to provide an appropriate constellation of services.

Severity of iron deficiency anemia in the first trimester is really a challenge faced by many south Asian countries. Majority of the women attend antenatal clinic during the second trimester. This results in lack of iron intake at the time of conception, further aggravated by the status of the ongoing pregnancy.<sup>19</sup> Despite the availability and easy access to medical care, high prevalence of anemia still prevalent indicates the level of ignorance and indifference to health needs. There is an urgent need to educate pregnant women and their families about the importance of antenatal care and maintenance of the optimum family size.

## IMPLICATION

Anemia remains to be a problem with multifactorial causes. Hence, intervention only with iron and folic supplements is not adequate to tackle this problem. Therefore, there is a need to use multiple interventions, comprehensive approaches for addressing major preventable causes of anemia. Researchers have to concentrate on interventional studies to improve the hemoglobin of women of childbearing age which may include preventive supplementation, food-based approaches and

nutrition education to improve dietary intake. Every Government has to take step to improve quality of services to the education and socioeconomic status of women, improving the number of health care providers and intensifying public education to promote the use of health services and healthy behaviors moreover adherence to the prescribed program in order to achieve the best result. Tackling this problem alone in pregnancy will not be effective, however providing long-term preventive weekly iron supplements and dietary modifications beginning with adolescence may improve the hemoglobin level and prevent anemia in pregnancy.

## LIMITATIONS OF THE REVIEW

All the studies selected were published between the years 2007 and 2011. There were few papers other than English language which were done in recent years and hence could not be included in the review. Only 10 studies were available for the review and hence generalization may be difficult. The studies reviewed could not cover all the South East Asian countries like Bhutan and Afghanistan, where recently published studies (2007-2011) were not available.

## CONCLUSION

The available evidence suggests that iron deficiency anemia contributes substantially to the women's health even today. Severe anemia during pregnancy is an important contributor to maternal mortality and morbidity. Eleven studies published between year 2007 and 2012 found that anemia prevalence in south Asian countries is still persisting. The estimated prevalence of anemia ranged from 18 to 80%, and the prevalence of severe anemia ranged from 2.7 to 20%. The review showed that anemia results from inadequate intake of bioavailable dietary iron, malaria, hook worm infestation. Moreover, the countries face challenges in improving the socioeconomic status, educational level and health behavior modifications.

## SALIENT FACTS

- In developing countries, every 2nd pregnant woman are estimated to be anemic.
- In developing countries, iron deficiency anemia is aggravated by inadequate intake of iron, dietary deficiency, worm infestations, malaria and other infectious diseases.
- Anemia even today contributes to 20% of all maternal deaths.
- One gm/dl increase in population mean hemoglobin could reduce the risk of maternal mortality by 25%.

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