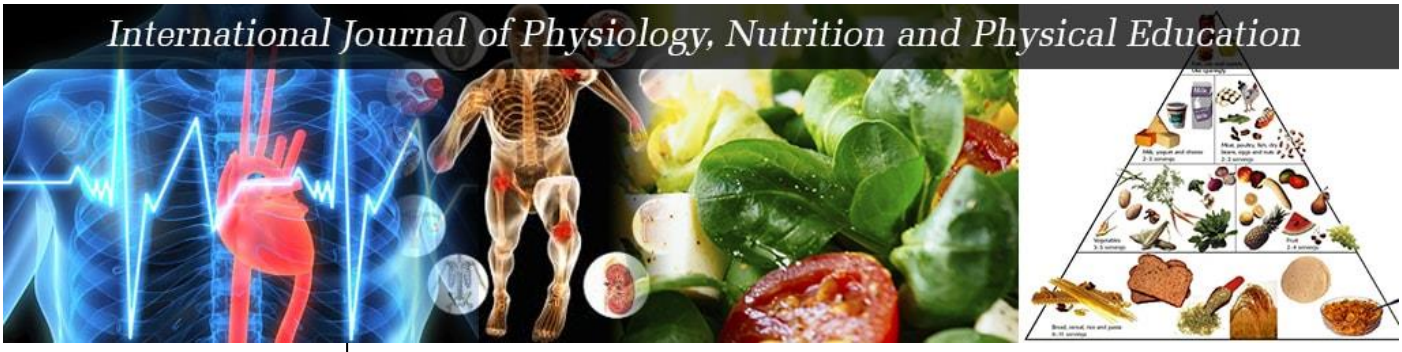

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Prevalence of anaemia among the women of reproductive age group belonging to low socioeconomic status of rural West Bengal, India

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Abstract
Anaemia is a major factor in women's health, in developing countries. Low socio-economic status plays a major role in diseases, including anaemia. Thus, women belonging to low socio-economic group are at high risk for anaemia, especially during their reproductive age (15 to 45 years). We conducted a community based cross-sectional study among women belonging to the age group 15-49 years and living in the rural areas of Paschim Medinipur District to find out the relationship between nutritional status and anaemia. The study was conducted during time period of July, 2016 to December, 2016. A total of 174 non pregnant and non-lactating women were included as study participants. The mean BMI, haemoglobin and serum ferritin of the participants were 19.73±3.54 kg/m2,11.04±1.58 g/dl and 27.06±10.16µg/l respectively. It is also noted that the mean haemoglobin level of the participants of different age groups viz. 15-19 years, 20-29 years, 30-39 years and 40-49 years were 11.32±1.57 g/dl, 11.24±1.70 g/dl, 10.78±1.45 g/dl and 10.94±1.57 g/dl respectively. The prevalence of underweight and overweight in this study population was 40.80% and 6.90% respectively. 66.67 percent women in this study were suffering from anaemia. This study clearly indicated that underweight (67.61%) and overweight (75.00%) participants had the higher prevalence of anaemia while the normal weight (64.84%) participants had the lowest one. It is indicated that these factors are not strongly associated with anaemia in this population. It may be suggested that malnutrition may be associated with anaemia.

Keywords: Anaemia, Undernutrition, haemoglobin, Serum ferritin

Introduction
Anaemia continues to be a major public health complication in the world [1]. According to estimation of the World Health Organization (WHO), globally nearly two billion people were suffering from anaemia [2]. The prevalence of anaemia is eighty per cent in pregnant women and sixty per cent in non- pregnant women in South East Asia [3]**.** The attributable factors for high prevalence of anaemia in this area were poverty, inadequate diet, certain diseases, pregnancy/lactation and poor access to health services [4]. Anaemia is a common health problems in India. Female and children are high risk group in this country. Prevalence of anaemia among them has been found to vary from 50-90% in different parts of India. The third National Family Health Study (NFHS-3) announced that the prevalence of anaemia is 55.3% amongst women aged between 15 to 49 years in India during 2005–06 as a whole, while the prevalence of anaemia among the same being 63.2% in West Bengal [5].

Different micronutrient deficiencies like iron, folate, and vitamin B_{12} are the main cause of anaemia [6]**.** Iron deficiency is the most common cause of nutritional anaemia and is accountable for almost a million deaths annually [7, 8]. Iron deficiency anaemia (IDA) is a major nutrition problem in India which can rise either due to an inadequate intake or poor bioavailability of dietary iron or due to loss of iron from the body [9]. The other important causes of anaemia are infections by malarial parasite and intestinal worms [3]. Hookworm infection is also a common cause of anaemia because it induces iron deficiency by chronic intestinal blood loss. Some socio-ecological factors like lack of education, large household size, poor family income, age, gender issues, birth spacing, lac of antenatal care and abnormal Body Mass Index (BMI) also play a role to become anaemic [3,10,11]**.**

The study was conducted among women belong to the age group 15-49 years and the study area was the rural areas of Paschim Medinipur District to find out the relationship between nutritional status and anaemia among the women of reproductive age group.

Methodology

Study type: This is a community based cross-sectional study.

Study Population: A total of 174 non pregnant and non lactating female belonging to reproductive age group. A written permission was obtained from the participants before conduction of the study. In case of the minor (<18years) group the consent was taken from their legal guardians.

Age group: 15 years to 49 years living in the area.

Study area: Rural areas of Paschim Medinipur District. It is 127 km away from Kolkata city, the provincial capital, towards west.

Duration of the study: The study was conducted during time period of July 2016 to December 2016.

Socio-economic Status: The socio-economic status was determined following the revised Kuppuswami's socioeconomic status scale [12].

Anthropometrical parameters: All anthropometric measurements were taken by trained investigators using the standard techniques [13]. All the equipments were properly maintained to minimize random errors. Height of the participants were measured to the nearest 0.1 cm by using Martin's anthropometer. Body weight of subjects was recorded to wear light cloth to the nearest 0.5 kg on a weighing scale (Doctor Beliram and Sons, New Delhi, India). The weighing scale was set to zero before every measurement. Participants were requested to remove their shoes before taking measurements of their height and weight. Errors of measurements were computed and they were found to be within acceptable limits [14].

Body mass index (BMI) was calculated using the following standard equation [15]:

$BMI\ (kg/m^2) = Weight\ (kg) / height^2\ (m^2)$

Nutritional status was compared with the help of World Health Organization BMI (kg/m^2) guidelines [16]. The cut-off points are given below:

Underweight: BMI < 18.5; Normal: BMI = 18.5 – 24.9; Overweight: BMI > 25.0.

For the age of <18 years, thinness and overweight were determined as per Cole *et al* [17, 18].

Bio-chemical parameters: Five milliliters of venous blood were drawn from every participant. An aliquot of the blood was placed immediately in a tube containing Drabkin's solution for haemoglobin estimation. The haemoglobin level was measured by following cyanmethaemoglobin method [19]. The haemoglobin level less than 12g/dl for women was treated as anaemia [5].

UNICEF/UNU/WHO guide line had followed for the public health problem of anaemia, based on adult populations worldwide. This classification categorises the prevalence of anaemia, which is as follows [20].

<5% anaemia signifies no public health problem, 5–19.9% anaemia signifies mild public health problem, 20–39.9% anaemia signifies moderate public health problem and >40% anaemia signifies severe public health problem.

Accu-Bind ELISA Microwells were used for measurements of serum ferritin level of the participants.

Statistical Analysis: Statistical analyses and data processing were made by using the SPSS for Windows statistical software package (SPSS Inc., Chicago, IL, USA 2001). Data is expressed as means and standard deviations, and group comparison was done using one way ANOVA. Pearson's chi-square test was analysed to determine significant differences discussed within the various categories of nutritional status. Product moment coefficient of co relation (r) between different biochemical parameters (haemoglobin and serum ferritin) and different anthropometric parameters (weight, height and BMI) were determined.

Results

Age, haemoglobin and anthropometric parameters of the female aged 15-49 years is presented in table 1. The mean age of the participant was 30.64±9.25 years. The mean BMI was19.73±3.54 and the mean haemoglobin and serum ferritin concentration of the participants is 11.04±1.58 g/dl and 27.06±10.16µg/l respectively. The table represents the study population having childbearing age. They are having almost normal BMI level. The table also shows that the study population suffered from anaemia.

Table 1: Age, haemoglobin and anthropometric parameters of the women aged 15-49 years

Parameters	Mean±sd	95% CI
Age (years)	30.64±9.25	29.25–3 2.02
Weight (kg)	43.87±8.09	42.66–45.08
Height (cm)	149.14±5.92	148.26–150.03
BMI (kg/m^2)	19.73±3.54	19.20–20.25
Haemoglobin (g/dl)	11.04±1.58	10.80–11.28
Serum ferritin (µg/l)	27.06±10.16	25.54–28.59

Table 2: Impact of nutritional status on the haemoglobin level and prevalence of anaemia of the women

Nutritional status	N	Haemoglobin (g/dl)[#]	Prevalence of Anaemia[§]
Underweight	71	10.94±1.65	48 (67.61)
Normal weight	91	11.09±1.48	59 (64.84)
Overweight	12	11.26±1.93	9 (75.00)
Total	174	11.04±1.58	116 (66.67)
		F=1.509; P>0.05	χ^2=0.541; P>0.05
Data represented as [#]mean±sd and [§]N(%)			

Impact of age on the BMI of the female is presented in Fig 1. In this study, it is clearly indicated that the BMI of the participants was significantly increased (F=3.342; P<0.05) in the linear form with the increasing ages.

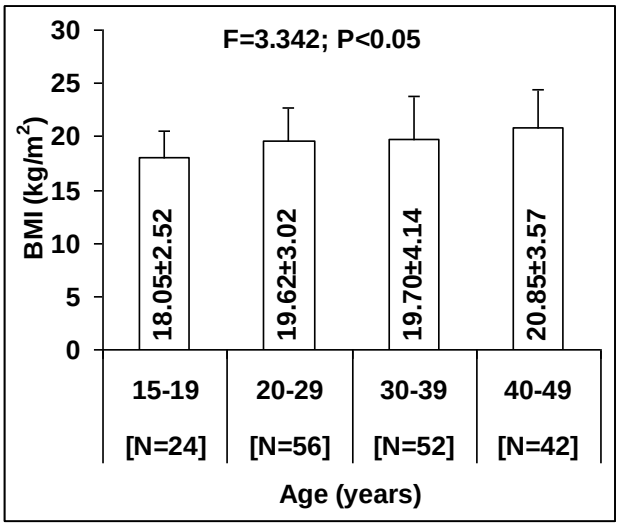

Fig 1: Impact of age on the BMI of the women

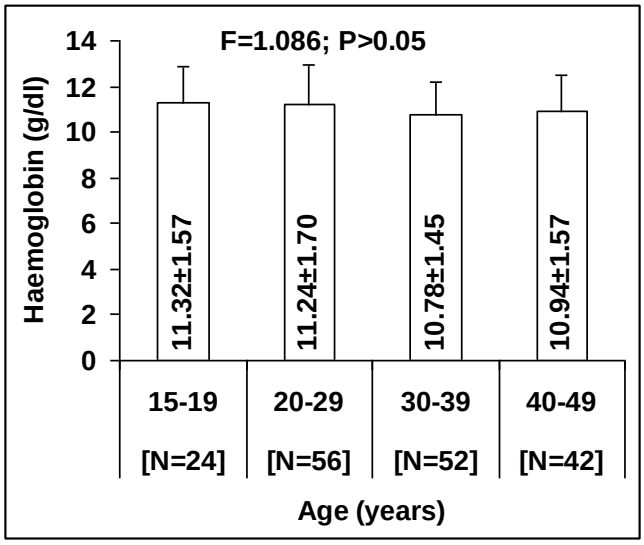

Fig 2: Impact of age on the haemoglobin of the women

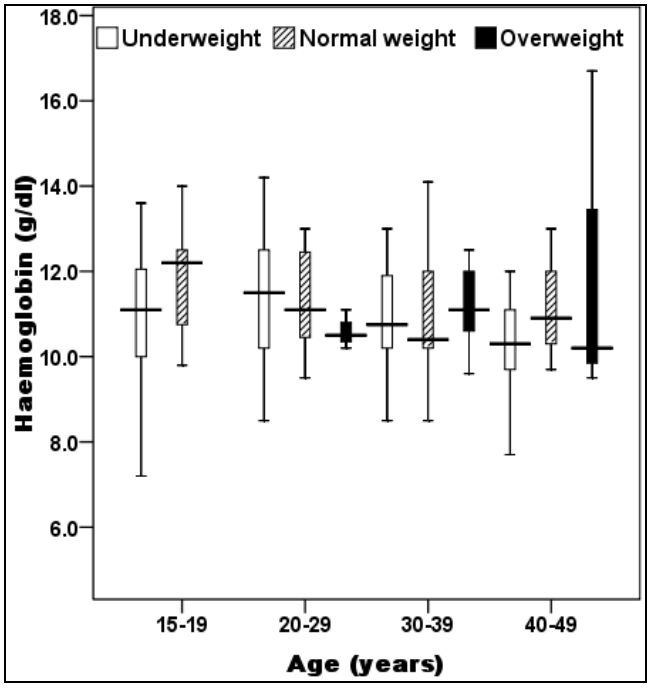

Fig 3: Impact of age and nutritional status on the

Haemoglobin level of the women

Impact of age on the haemoglobin of the women is presented in Fig 2. In this study, it is noted that the mean haemoglobin level of the participants of different age groups were11.32±1.57 g/dl, 11.24±1.70 g/dl, 10.78±1.45 g/dl and 10.94±1.57 g/dl respectively. This indicated that haemoglobin level was lower in the upper age group than the lower age group.

Impact of nutritional status on the haemoglobin level and prevalence of anaemia in the women is presented in table 2. The prevalence of underweight and overweight in this study population was 40.80% and 6.90% respectively. This clearly indicated that nearly half of the participants were suffering from any type of malnutrition, i.e., either under-nutrition or over-nutrition. It was also indicated that the prevalence of anaemia among the participants were 66.67%. Interestingly, the 'J' shaped relation was noticed while studying the prevalence of anaemia among the different nutritional status of the participants. The underweight (67.61%) and overweight (75.00%) participants had the higher prevalence of anaemia while the normal weight (64.84%) participants had the lowest one. Though statistically significance (χ^2=0.541; P>0.05) was not observed, but it may be suggested that malnutrition is associated with anaemia.

Impact of age and nutritional status on the haemoglobin level of the female is presented in Fig 3. This study indicated that the nutritional status of the participants had a greater impact on the mean haemoglobin level.

Distribution of haemoglobin and serum ferritin according to BMI and age group of the women is presented in Fig 4. The scatter plot diagram clearly showed that age had no association with haemoglobin level and serum ferritin of the participants. The prevalence of anaemia in four age group viz. 15-19 years, 20-29 years, 30-39 years and 40-49 years were 54.17%, 62.50%, 73.08% and 71.43% respectively.

Impact of age and nutritional status on the prevalence of anaemia of the female is presented in Fig 5. The lowest prevalence of anaemia was observed among the participants with normal weight belonging to the age group of 15-19 years, while the highest one was reported among the participants with overweight belonging to the age group of 20-29 years.

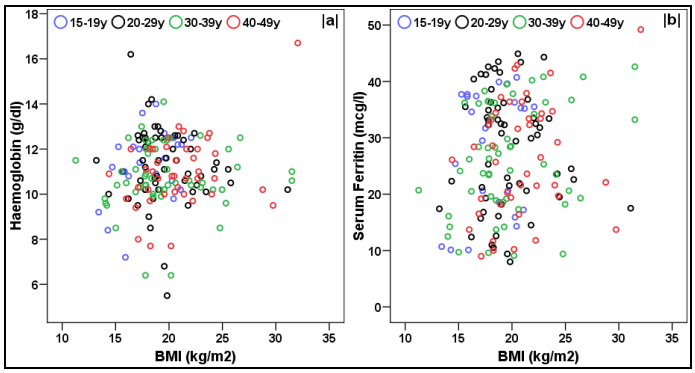

Fig 4: Distribution of haemoglobin and serum ferritin according to BMI and age group of the women

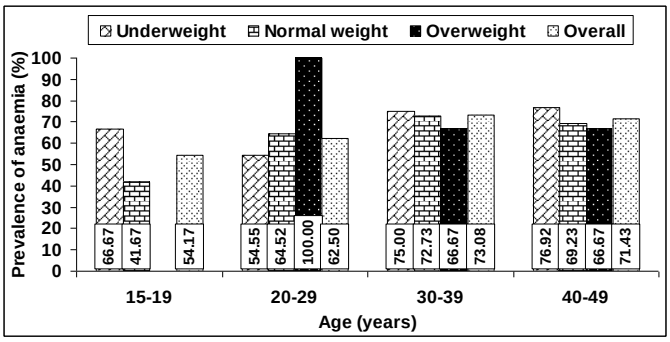

Fig 5: Impact of age and nutritional status on the prevalence of anaemia of the women

Table 3: Relationship of haemoglobin and serum ferritin with different anthropometric parameters

Anthropometric parameters	Haemoglobin (g/dl)	Serum Ferritin (µg/l)
Age (years)	-0.070	-0.055
Weight (kg)	0.155*	0.206**
Height (cm)	0.163*	0.131
BMI (kg/m^2)	0.086	0.155*
Significance level at *P<0.05; **P<0.01		

Relationship between haemoglobin and different anthropometric parameters is presented in table 3. It was

clearly observed that age (r=-0.070; *P*>0.05) and BMI (r=0.086; *P*>0.05) had no effect on the haemoglobin of the participants while BMI (r=0.155; *P*<0.05) of the participants clearly indicated a positive impact on serum ferritin. It indicated that there may be some other factors associated with anaemia in this population.

Discussion

In this study, the prevalence of anaemia among the participants was 66.67%. This clearly indicated that the women in this locality were in severe public health problem according to the guideline of WHO as the prevalence of anaemia is more than 40% [20]. It was found from this study. The prevalence of anaemia is higher among the study population than the other recent studies in India which was reported that a prevalence of anaemia as 55.3%. In West Bengal it is reported as 63.2% [5], but is lower than the study occurred by Gupta *et al*. among the female lived in rural area of Madhya Pradesh, India (82%) [9]. Chandyo *et al*. [21] observed that the prevalence of anaemia among non-pregnant women in Nepal to be only 12.0% while Gebremedhin and Enquselassie [22] found 27.4% among the women of reproductive age in Ethiopia. When the researchers compared their result with the international scenario, it is observed that it is much higher than the global prevalence of anaemia among women which is 30.2% [23].

The prevalence of underweight and overweight in this study population was 40.80% and 6.90% respectively. This clearly indicated that nearly half of the participants were malnourished, i.e., either under-nutrition or over-nutrition. Interestingly, the 'J' shaped relationship was noticed while studying the prevalence of anaemia among the participants and it reflect the nutritional status of the study population. The malnourished population both underweight (67.61%) and overweight (75.00%) had the higher prevalence of anaemia. It is significantly noticed that participants having normal weight (64.84%) had better haemoglobin concentration. Though statistically significance (χ^2=0.541; *P*>0.05) was not observed, but it may be suggested that malnutrition is associated with anaemia. While studying the serum ferritin, a sensible indicator of iron deficiency, it was noted that there is a positive correlation between serum ferritin level and BMI. Thus it clearly indicated that nutritional deficiency may one of the factors behind this high prevalence of anaemia in this locality. The women in this study were from the low socioeconomic group, this may drastically affect the purchasing power, availability of proper health care facility and living in a good quality of life. The proper knowledge of the low cost nutritious food was also poor in these women.

In this study, it was also noted that prevalence anaemia of was comparatively low among the female of age group 15-19 years than any other age group, while the females of 30-39 years were most sufferer to anaemia. This may be the results of reproductive burden during this phase. The recent report of NFHS stated that three fourth of the rural women received the antenatal care from a skilled provider and the fertility rate of the rural women were 2.98 [5]. Thus, the inadequate antenatal, perinatal, postnatal care along with high fertility rate among the undernourished women drastically affects their health/nutritional status and they become more prone to become under-nutrition/anaemia. The inequity in the food distribution among the family members was also one of the reasons for this high prevalence of under-nutrition/anaemia in the rural area. Another study in this locality found that 11.62% of the people had hemoglobinopathies [24]. This may be one of the contributing factors for high prevalence of anaemia in this locality.

Conclusion

From this study we found that almost half of the study population were malnourished. So it is concluded from the study that the malnutrition is a striking factor of anaemia. Participant belonging 30 to 39 years of age were more prone to anaemia. This may due to reproductive burden and under nutrition. In this study it was found that serum ferritin level stands as a noticeable factor of iron deficiency anaemia and there is a significant correlation between serum level and BMI of the respondents. It is also found from the study 66.67% of the study population were suffering from anaemia, a public health issue of the community. So proper nutritional care as well as health care is needed for this community for better future of our nation.

References

1. Raghuram V, Manjula A, Jayaram S. Prevalence of anaemia amongst women in the reproductive age group in a rural area in South India. Int J Biol Med Res, 2012; 3(2):1482-1484.
2. Underwood B. The extent and magnitude of iron deficiency and anaemia. In: Anna Verster (Ed.): Guidelines for the Control of Iron Deficiency in Countries of the Eastern Mediterranean, Middle East and North Africa. Alexandria: World Health Organization Regional Office for the Eastern Mediterranean, 1996, 14-18.
3. Trinh LTT, Dibley M. Anaemia in pregnant, postpartum and non-pregnant women in Lak district, Daklak province of Vietnam. Asia Pac J Clin Nutr, 2007; 16(2):310-315.
4. Kaur S, Deshmukh PR, Garg BS. Epidemiological correlates of nutritional anemia in adolescent girls of rural Wardha. Indian J Comm Med, 2006; 31(4):255-258.
5. IIPS. National Family Health Survey (NFHS-3), 2005–06. Volume I. Mumbai: International Institute for Population Sciences (IIPS) and Macro International. 2007
6. Provan D, Weatherall D. Red cells II: Acquired anaemias and policythaemia, Lancet, 2000; 355:1260-1268.
7. Hercberg S, Galan P. Nutritional anaemias. Baillieres Clin Haematol, 1992; 5:143-168.
8. Cook JD, Skikne BS, Baynes RD. Iron deficiency: The global perspective. Adv Exp Med Biol. 1994; 356:219-228.
9. Gupta SK, Agarwal SS, Kaushal R, Jain A, Gupta VK, Khare N. Prevalence of anemia among rural population living in and around of rural health and training center, Ratua Village of Madhya Pradesh. Muller J Med Sci Res, 2014; 5(1):15-18.
10. Mishra P, Ahluwalia SK, Garg PK, Kar R, Panda GK. The prevalence of anaemia among reproductive age group (15-45 yrs) women in a PHC of rural field practice area of MM Medical College, Ambala, India. J Women Health Care, 2012; 1:113.
11. Sinha NK, Haldar JP. Correlation between haemoglobin level and anthropometric variables: A study on women of reproductive age group, West Bengal. Anthropol. 2015; 19(1):185-92.
12. Mishra D, Singh HP. Kuppuswami's socio-economic status scale: A revision. Indian J Pediatr, 2003; 70:273-274.
13. Lohman TG, Roche AF, Martorell R. Anthropometric

Standardization Reference Manual. Champaign, Illinois: Human Kinetics Books. 1988.
14. Ulijaszek SJ, Kerr DA. Anthropometric measurement error and the assessment of nutritional status. Br J Nutr, 1999; 82:165-177.
15. Park K. Park's Textbook of Preventive and Social Medicine. 18th Edition. Bhanot, Jabalpur: M/s Banarsidas. 2005.
16. World Health Organization. Physical Status: The Use and Interpretation of Anthropometry. Report of a WHO Expert Committee. Technical Report Series, No. 854. Geneva: World Health Organization. 1995
17. Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: International survey. BMJ, 2000; 320:1240-1243.
18. Cole TJ, Flegal KM, Nicholls D, Jackson AA. Body mass index cut offs to define thinness in children and adolescents: International survey. BMJ, 2007; 335:194-198.
19. Dallman PR. Diagnosis of anemia and iron deficiency: Analytic and biological variations of laboratory tests. Am J Clin Nutr, 1984; 39:937–941.
20. United Nations Children's Fund/United Nations University/World Health Organization 2001. Iron Deficiency Anaemia: Assessment, Prevention, and Control. Geneva: World Health Organization.
21. Chandyo RK, Strand TA, Ulvik RJ, Adhikari RK, Ulak M, Dixit H, Sommerfelt H. Prevalence of iron deficiency and anemia among healthy women of reproductive age in Bhaktapur. Nepal Eur J Clin Nutr, 2007; 61(2):1-8.
22. Gebremedhin S, Enquselassie F. Correlates of anemia among women of reproductive age in Ethiopia: Evidence from Ethiopian DHS 2005. Ethiop J Health Dev, 2011; 25(1):22-30.
23. McLean E, Cogswell M, Egli I, Wojdyla D, de Benoist B. Worldwide prevalence of anemia in preschool aged children, pregnant women and non-pregnant women of reproductive age. In: K Kraemer, MB Zimmermann (Eds.): Nutritional Anemia. Basel, Switzerland: Sight and Life Press, 2007, 1-12.
24. Mandal PK, Maji SK, Dolai TK. Present scenario of hemoglobinopathies in West Bengal, India: An analysis of a large population. Int J Med Public Health, 2014; 4:496-9.