Prevalence of Anaemia among Adolescent girls of Baiga (PVTGs) of Chhattisgarh, India

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ABSTRACT : *Anaemia is a global health problem which affects the health of the people as well as social & economic development. The status of anaemia among the population shows vauation as per age and sex, similarly, their is a changing pattern reported by many studies viz.(Worldwide prevalence of anaemia, 1993–2005). It can be considered as anaemia among tribal and rural adolescent girls can be attributed to poor nutrition as well as lack of awareness in this regard. UNICEF,(2012) reported that in India all around 56% of adolescent girl and 30% of adolescent boy are anaemic. This scenario is more chronic among adolescent of tribal areas which lead to conduct the present anthropological investigation to assess the prevalence of anaemia among adolescent girls aged 10-18 years of Baiga's of Chhattisgarh, India. To full fil the objectives a total of 360 adolescent girls were purposively selected from three districts Bilaspur, Kabirdham, and Mungeli of Chhattisgarh. The finding reveals that the prevalence of anaemia among Baiga adolescent girls is 94.7% which is lower than the previously studied adolescent girls of different regional area like Jaipur, Andhra Pradesh, and Odisha whereas it was higher than the cluster of studies from Rajasthan, Haryana, Madhya Pradesh, Uttar Pradesh, Maharashtra, Chhattisgarh, and Karnataka. Although, they are also lacking in proper nutrition and suffered many associated health problems which leads to chronical chances for poor level of haemoglobin. It is an alarming indicator and needs to be taken care of to make policies for their children.*

Keywords – Anaemia, Adolescent girls, and Baiga tribe

INTRODUCTION

Anaemia is the most common disorder and it occur due to the number of red blood cells circulating in the body decreases. The adolescent is growing period and anemia due to any reason is harmful and can be a barrier in this process, the red blood cells carry oxygen to each and every cell of the body and anemia hence can affect function of each & every cell of the body, chronic anemia can be detrimental for proper growth and development and in later stage it may also affect the reproductive process. The postpartum status and the health of the child born out of anaemic mothers again may be unhealthy and have health problems so this is a vicious cycle which should be broken.

Anaemia is a condition in which the number of red blood cells (RBCs) are decreased resulting in the insufficient oxygen-carrying capacity of the RBCs to meet the physiological needs of the body (WHO, 2011). Globally, iron deficiency is thought to be the most common cause of anemia. However, other nutritional deficiencies (including folate, vitamin B12, and vitamin A deficiencies), acute and chronic inflammation, parasitic infections, and inherited or acquired disorders that affect hemoglobin synthesis, red blood cell production, or red blood cell survival can all cause anemia (WHO, 2011 and Fauci, 2012).

Globally, anaemia affects 1.62 billion people, and the highest prevalence is in preschool-age children (47.4%), and the lowest prevalence is in men (12.7%) (Worldwide prevalence of anaemia, 1993–2005).

Malnutrition in the form of anaemia is present in a large proportion of India's adolescents with 56% of girls and 30% of boys being anaemic (UNICEF, 2012). Anaemia among adolescents adversely affects growth, resistance to infections, cognitive development, and work productivity. Chronically malnourished adolescent girls are more likely to remain undernourished during adulthood and pregnancy and thus are more likely to deliver low birth weight babies creating a vicious cycle (WHO 2006).More than two billion people of different age groups are affected by anaemia worldwide in developing and developed countries (Mc lean et al, 2009). The prevalence of anaemia in India is 60-70% (Park, 2005).

Nutritional problems have serious health implications impacting on the physical development, psychological, behavioural, work performance. The nutritional status of adolescents is a big challenge especially in India, it has been reported that around half of the adolescent are wasted and 40% are stunted (FANTA 2014).

UNICEF (2012) report warns that anaemia, most commonly iron-deficiency anaemia, increases the maternal risk of haemorrhage and sepsis during childbirth. It also causes cognitive and physical deficits in young children and reduces productivity in adults. The report also indicates that girls, of the 15-19 age group old account for 11 % of all births and around 14 % of all maternal deaths, with some 50,000 girls dying from maternal causes annually. National Family Health Survey (NFHS)-4 (2015-2016) data highlights that the prevalence of anaemia in India is highest among children under five years of age (58.6%), followed by 53.1% among females (non-pregnant and pregnant aged 15-49 years) and 22.7% among men (aged 15-49 years).

National Nutrition DLHS-2 Report (2006), In Chhattisgarh, 99 % of adolescent girls have any anaemia. 21% of them are mildly anaemic, 40 % are moderately anaemic, and 48% are having severe anaemia. It has been found from the survey results that except mild anaemia, and moderate anaemia the %age of anaemia among adolescent girls are same with increase in age from 10-14 and 15-19. The highest incidence of any anaemia is reported among adolescent girls who are currently married compared to that among their unmarried counterparts. Except severe anaemia, the occurrence of anaemia in the other categories is found to be higher in urban areas compared to their rural counterparts.

Chhattisgarh is a tribal-dominated state, and the tribal children of this states represent a mixture of poverty, poor care, illiteracy, and inadequate health services. The highest priority should be given to 10-18 years old girls who are going to school and who are not attending. They must be given correct nutrition and anaemia should be corrected.

Indian tribal communities are socially and economically deprived and they are unable to suffice their nutritional needs due to uncertainty of food supply, lack of awareness regarding health and nutrition policies, poor availability of health facilities, and poor standard of living (Shrinivasa et al., 2014; Bharati et al.,2009 and Bharati et al., 2015).

Baiga tribe is one of the particularly vulnerable tribes of Chhattisgarh. In the state, Major population groups of Baiga is living in Bilaspur, Kabirdham, and Mungeli district, and their economy is based on agriculture, labour, basketry, and collection of minor forest produces. The traditions of pre-agricultural practices such as hunting-gathering, low levels of population growth, extremely low literacy, poor nutrition, and widespread unemployment among the Baigas, has contributed to the classification of the tribal group as a PVTGs. Accounting half of all cases, iron deficiency anemia is the most common cause of anemia. However, other

conditions like nutritional deficiencies, acute and chronic inflammation, parasitic infections, growth spurt, increase in iron requirements, increased iron loss from the body during the menstruation, inherited or acquired disorders of hemoglobin synthesis, RBC production, or survival are also considered cause of anemia (WHO, 2014).The transitional phase of adolescence particularly among girls demands good nutrition and makes them more vulnerable to nutritional deficiencies. The present study has been conducted to assess the nutritional profile and prevalence of anaemia among Baiga adolescent girls (aged 10-18 years) of selected study area of Chhattisgarh.

METHODS

The present cross-sectional study conducted to assess the prevalence of anemia among the Baiga adolescent girls of three districts (Bilaspur, Kabirdham, and Mungeli) of Chhattisgarh. A total of 360school going Baiga adolescent girls aged 10 to 18 years were purposive selected from Baiga dominating districts and blocks. Random sampling also used in selection of girls and school for the present study. Haemo Cue method is used for assessing the level of hemoglobin. Data was collected from three districts of Chhattisgarh viz. A cross-sectional sample of apparently healthy was collected. The date of birth of each girl was recorded from the school registers. Schools from each district were selected on the basis of predominating Baiga population. 10 schools from each block were randomly selected for the present study. The blood sample was taken by a trained technician. Anemia, as defined by World Health Organization guidelines (2011) for determination of different grades of anemia was adopted to classify individuals into non-anemic and anemic. Ethical approval was obtained from Institutional Ethical Committee for Human Resource, Pt. Ravishankar Shukla University. Informed consent was obtained from all the participants of the study. After collection of data, analysis was done in Microsoft Excel 2010, and SPSS version 25.0 for windows.

RESULTS

To assess the prevalence of anemia among 360 adolescent Biaga girls of purposively selected field base studies area, the data were collected on level of hemoglobin and others and their analysis done by using Microsoft excel 2010, and SPSS (V.-25). The finding of analysis is elaborating in following tables and figures.

Table 1. Distribution of Mean, SD and CV of Hemoglobin level among the Baiga adolescent girls.

Age (yrs)	No of Girls	Mean	SD	CV	Absolute Growth	Rate of Growth(%)
10	40	9.5	1.40	14.7	-	-
11	40	10.1	0.61	6.0	0.6	6.20
12	40	9.8	0.96	9.8	-0.3	-3.17
13	40	10.1	1.11	11.0	0.3	3.27
14	40	10.2	0.96	9.4	0.1	1.19
15	40	10.3	0.93	9.0	0.1	0.78
16	40	10.0	0.96	9.6	-0.3	-2.91
17	40	10.1	1.00	9.9	0.1	1.00
18	40	9.7	1.15	11.9	-0.4	-3.96
Total	360	10.0	1.04	10.4	0.2	2.00

Table 1.representsthe descriptive statistics of haemoglobin level of Baiga adolescent girls. Among them the mean value of haemoglobin at the age of 10 years was 9.5 gm/dl is lowest and highest at age of 15 year i.e. 10.3 gm/dl. The distance curve depicted an increase in the haemoglobin level of girls from 10 to 11 years, followed by a fluctuating trend till 18 years. Girls exhibited a maximum increase in haemoglobin level from 10 to 11 years (0.6 gm/dl), where a decrease of 0.30 gm/dl in between 11 to 12 years.

Anaemia classification of World Health Organization (2011)was used for elaboration the prevalence of anaemia in Baiga adolescent girls and is summarised in **Table 2.** It is apparent from the table2 that the prevalence of anaemia in the present studied girls was 94.7% and only, 5.3% of girls found non-anaemic. The highest prevalence of anaemia (100%) was found among girls between 11 to 12 years of age whereas it was lowest at 16 years (90.2%). Table2 also shows that 10.5% girls had mild anaemia; 78% girls had moderate anaemia and 6.2% girls suffered from severe anaemia. The centile number of girls at age between 11 to 12 years were found anaemic. The highest prevalence of severe anaemia was reported at 10 years (27.5%); moderate anaemia at 11 years (90%) and mild anaemia at 15 years (17.5%). The highest frequency of non-anaemic was found at 16 years of age (10%). The frequency of moderate anaemia was 57.5% at 10 years which showed an increase with age (72.5%) till 17 years. 27.5% girls at 10 years were suffering from severe anaemia and its prevalence declined to 12.5% at

17 years. The categorized level of anaemia among studied population is also elucidated in Figure 1.

Table 2. Age wise distribution of Non-Anaemic and Anaemic Baiga adolescent girls as per WHO, 2011

Age (yrs)	No of Subjects	Non-Anaemic N (%)	Anaemic N (%)			
			Mild 10-11.9 g/dl	Moderate 8-10.9 g/dl	Severe (8<g/dl)	Total N (%)
10	**40**	3 (7.5)	3(7.5)	23 (57.5)	11(27.5)	37 (92.5)
11	**40**	0 (0.0)	4 (10.0)	36 (90.0)	0 (0.0)	40 (100.0)
12	**40**	0 (0.0)	5 (12.5)	32 (80.0)	3 (7.5)	40 (100.0)
13	**40**	3 (7.5)	7 (17.5)	28 (70.0)	2 (5.0)	37 (92.5)
14	**40**	3 (7.5)	3 (7.5)	33 (82.5)	1 (5.0)	37 (92.5)
15	**40**	2 (5.0)	7 (17.5)	31 (77.5)	0 (0.0)	38 (95.0)
16	**40**	4 (10.0)	1 (2.5)	35 (87.5)	0 (0.0)	36 (90.0)
17	**40**	2 (5.0)	4 (10.0)	34 (85.0)	0 (0.0)	38 (95.0)
18	**40**	2 (5.0)	4 (10.0)	29 (72.5)	5 (12.5)	38 (95.0)
Total	**360**	**19 (5.3)**	**38(10.5)**	**281 (78.0)**	**22 (6.2)**	**341 (94.7)**

Figure 1.Age wise prevalence of different grades of Anaemia among the Baiga Adolescent girls according to WHO 2011.
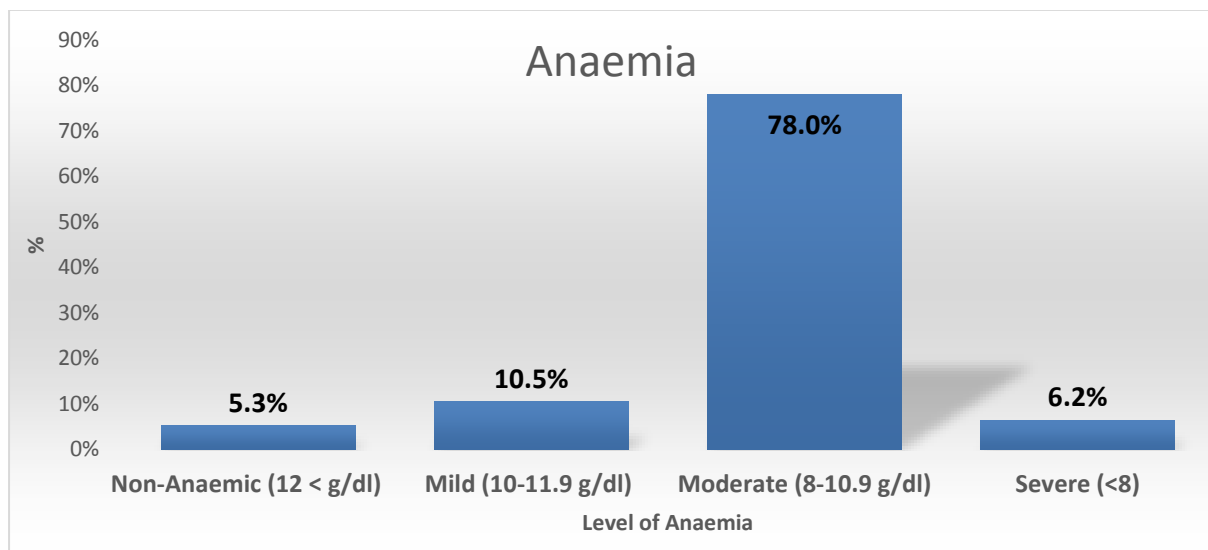
Table 3. Comparative prevalence of Anaemia among various previously studied Indian population with Baiga Adolescent girls of Chhattisgarh.

Study (Year)	Areas	Age groups (Years)	Prevalence of Anaemia (%)
Chaturvedi et al. (1996)	Rajasthan	10-18	73.7
Choudhary et al. (2003)	Rural area of Varanasi, Uttar Pradesh	10-19	30.7
Goyal & Prakash (2009)	Jaipur, Rajasthan	10-15	96.3
Dhingra (2011)	Jammu & Kashmir	13-15	90.5
Kakkar et al.(2011)	Bhopal, Madhya Pradesh	10-19	58.4
Siddharam, Vanketesh, and Thejeshwari (2011)	Rural areas of the Hassan district, Karnataka	10-19	45.2
Kuril et al. (2015)	Karnal, Haryana	13-15	88.0
Hussain & Kahn, (2015)	Chandragiri, Chittoor district, Andhra Pradesh	14-17	73.3
Chandran et al. (2016)	Kakinada, Andhra Pradesh	10-14	97.8
Udayar et al. (2016)	Chittoor, Andhra Pradesh	10-19	46.8
Savanur et al. (2017)	Tribal adolescents in Ahmednagar district of Maharashtra	10-18	18.4
Patel et al. (2017)	Rural area of Raipur district, Chhattisgarh	10-18	36.4
Kurrey et al. (2017)	Birhor children: A primitive tribe of Chhattisgarh.	5-18	66.0
Nanda et al. (2017)	Dongria Kondh tribe, Rayagada , Odisha	10-19	100
Kulkarni et al. (2019)	Palghar district, Maharashtra	12-18	92.7
Agrawal S et al. (2019)	Raipur and Jashpur district of Chhattisgarh	12-19	51.7
Goyal PA et al. (2020)	Yamunanagar, Haryana	9-17	91.1
Pool Data	**Baiga Adolescent girls of Chhattisgarh**	**10-18**	**94.7**

DISCUSSION

In the present study, the prevalence of anaemia among Baiga adolescent girls was found to be 94.7%. The highest prevalence of severe anaemia was reported at 10 years (27.5%); moderate anaemia at 11 years (90%) and mild anaemia at 15 years (17.5%). The highest frequency of non-anaemic was found at 16 years of age (10%). The frequency of moderate anaemia was 57.5% at 10 years which showed an increase with age (72.5%) till 17 years. 27.5% girls at 10 years were suffering from severe anaemia and its prevalence declined to 12.5% at 17 years. The Table 3 shows that the comparative data on prevalence of anaemia among

previously studied different populations and Pool data. It is reveals that the prevalence of anaemia in the Baiga adolescent girls of the present study was lower than prevalence reported among girls from Jaipur (96.3%) (Goyal and Prakash, 2009), Kakinada, Andhra Pradesh (97.8%) (Chandran et al, 2016) and Dongria Kondh tribe, Rayagada , Odisha (100%) (Nanda and Dhar, 2017) whereas, it was found to be higher than girls from Rajasthan (Chaturvedi et al.,1996); Haryana (Kuril et al., 2015; Goyal and Talwar, 2020); Madhya Pradesh (Rao et. al., 2003; Kakkar et al., 2011); Uttar Pradesh (Choudhary et al.,2003); Maharashtra (Savanur et al., 2017; Kulkarni et. al., 2019); Madhya Pradesh (Kakkar et al., 2011); Andhra Pradesh (Hussain & Kahn.,2015 and Udayar et al., 2016); Chhattisgarh (Kurrey et al., 2017; Patel et al., 2017); Karnataka (Siddharam, Vanketesh, and Thejeshwari,2011); Jammu Jammu & Kashmir, Dhingra, 2011. The prevalence of anaemia among the female in India is predominantly high and same is the case with the girls of Baiga tribe of Chhattisgarh. This is similar to the study done by Kulkarni et al., 2019 regarding the nutritional status of adolescent girls in tribal block of Maharashtra. Such a high prevalence of anaemia in the girls of the present study may be attributed to the poor socio-economic and environmental factors along with dietary intake of the Baiga girls. The factors associated with anemia among the Baiga girls needed to be explored and a necessary intervention program should be planned. As the overall anemia among Indian adolescent girls is high, the prevalence of anemia among the tribal population may have different pursuits. The living conduction among the tribal population is very different from other populations and it may also vary among different tribes, hence it was decided to study the status of Baiga tribal adolescent girls to assess the nutritional status by means of the prevalence of anemia.

CONCLUSION

A high prevalence of anaemia among Biaga's adolescent girls of selected district of Chhattisgarh was observed may be different reasons, and lack of proper nutrition may be one of them. Findings also reveals that the level of haemoglobin is poor among adolescent Biaga girls of present study in comparison with previously done studies at national levels. The result of the present study indicates that a fair number of adolescent girls are anaemic and they were also categorized as malnourished in term of their haemoglobin level and growth and physical characters. It is a warning sign and needs to be taken care of to make policies for their children. The findings provide baseline data for planning awareness programs for adolescent girls of these tribal regions. The three-pronged strategy of increasing iron intake in every household through dietary diversifications and use of iron-fortified iodized salts, providing IFA

supplementations to vulnerable groups, testing, and timely treatment of pregnant women and adolescent girls, with anaemia, is required to accelerate the pace of reduction in the prevalence of iron-deficient anaemia to enable the country to achieve Sustainable Development Goals (SDG) target for the reduction of anaemia.

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REFERENCES

Bharati P, Shome S, Chakrabarty S, Bharati S and Pal M. 2009. Burden of anemia and its socioeconomic determinants among adolescent girls in India. Food Nutr Bull30(3):217-226.

Bharati S, Pal M, Som S, and Bharati P. 2015. Temporal trend of anemia among reproductive-aged women in India. Asia Pacific Journal of Public Health 27(2):1193-1207.

Chandran CNM, Rambabu B, Prasad AK, Manikyamba D and Manojna B. 2016. Study of Prevalence of Anaemia and Impact of Iron Supplementation In School Children. J. Evolution Med. Dent. Sci. 5(16):758-762.

Chaturvedi S, Kapil U, Gnanasekaran N, Sachdev S, Pandey RM&Bhanti T. 1996. Nutrient intake amongst adolescent girls belonging to poor socioeconomic group of rural area of Rajasthan. India Pediatrics 33: 197-202.

Choudhary,Mishra and Shukla. 2003. Nutritional status of adolescent girls in rural area of Varanasi. India J.Prev.Soc.Med30 (1&2): 53-61.

Dhingra, R. 2011. An assessment of health status of adolescent Gujjar tribal girls of Jammu district. Studies of Tribes and Tribals9(2):133-138.

District Level Household Survey (DLHS-2) 2002-04. Nutritional Status of Children and Prevalence of Anaemia among Children, Adolescent girls and Pregnant women. 73-83.

Fauci, AS. 2012. Harrison's Principles of Internal Medicine. 18th ed McGraw-Hill Companies.

Food and Nutrition Technical Assistance 2014. India Nutrition Profile. Food and Nutrition Technical Assistance. Available from: https://www.fantaproject.org/

Goyle A and Prakash S. 2009. Iron status of adolescents girls (10-15 years) attending a government school in Jaipur city, Rajasthan, India. Mal JNutr 15(1):205-11

Goyal P and Talwar I. 2020. Assessment of Nutritional status and its correlates among adolescent girls of Haryana, India. Annals of pediatrics& Child health 8(10):1217.

Hussain and Kahn. 2015. Comparative study of the nutritional and health status among adolescent students (boys and girls) in rural area, Chandragiri chittoor district. Andhra Pradesh.IOSR journal of dental and medical science 14(9):30-37.

International Institute for population Studies (IIPS), ICF2015-16. National Family Health Survey (NFHS-4), Mumbai.

Kakkar R, Kakkar M, Kandpal SD & Ethane S. 2011. Study of anemia in adolescent schoolgirls of Bhopal. Indian Journal of Community Health 22(2,1):38-40.

Kulkarni R, Surve S, Patil S, Sankhe L, Gupta P and Toteja G. 2019. Nutritional status of adolescent girls in tribal blocks of Maharashtra. Indian Journal of Community Medicine 44(3): 281-284.

Kuril BM, Lone DK, Janbade C, Ankushe RT, Gujarathi VV. 2015. Prevalence and risk factors of anaemia among adolescent girls in rural area. Int J Tecent Trends Tech 14(3):617-622.

Kurrey V, Sharma L, Nahrel R and Phuljhele S. 2017. Study of health and morbidity pattern in 5-18 years Birhor children: A primitive tribe of Chhattisgarh.Indian Journal of Child Health 4(2): 180-183.

Mclean, E., Cogswell, M., Egli I., Wojdyla, D., and de Benoist, B. 2009. Worldwide prevalence of anaemia, WHO vitamin and mineral nutrition information system, 1993-2005. Public health Nutrition 12:444-454.

Nanda S and Dhar, R.N. 2017. A study on nutritional status of adolescent girls of DongriaKondh tribe. International journal of Community Medicine and Public Health 4(5): 1573-1576.

Park K: Park's textbook of preventive and social medicine. 18th Edn.; 2005;450,465.

Patel S. Dhuppar P and Bhattar A. 2017. Nutritional Anemia Status in adolescent girls in rural schools in Raipur, India 7(4): 853-856.

Udayar ES, Kommula D and Prasad D. 2016.Study of nutritional status and its relation to morbid conditions among adolescent girls residing in social welfare hostels in the Kuppammandal of Chittoor district, Andhra Pradesh, India. International Journal of Community Medicine and Publice Health 3(3):636-640.

UNICEF (United Nations International Children's Emergency Fund) 2012. Progress for children-A report card on adolescents, Number 10, UNICEF, New York :20-24.

Savanur MS, Sathye A, Udawant A, Udipi SA, Ghugre P, Haas J, Erick Boy & Bhatnaga A. 2017. Nutritional Status and Physical Fitness of Tribal Adolescents in Ahmednagar District of Maharashtra. Ecology of Food and Nutrition 56(6):552-566.

Sharvanan EU, Kommula D & Prasad DV. 2016. Study of nutritional status and its relation to morbid conditions among adolescent girls residing in social welfare hostels in the Kuppammandal of Chittoor district, Andhra Pradesh, India. International Journal of Community Medicine and Public Health 3 (3): 636-640.

Shrinivasa BM, Philip RR, Krishnapali VK, Surah A and Sreelakshmi. 2014. Prevalence of anemia among tribal women of reproductive age-group in Wayanad district of Kerala. Int J Health Allied Sci 1(3&2):120-124.

Siddharam SM, Venketesh GM, &Thejeshwari HL. 2011. A study of anaemia among adolescent girls in rural area of Hassan district, Karnataka, South India. international Journal of Biological & Medical Research 2(4) :922-924.

World Health Organization (WHO) 2006. Adolescent nutrition: A review of the situation in selected South-East Asian countries. New Delhi

World Health Organization (WHO) 2011. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity.

World Health Organization (WHO 2014), Global Nutrition Targets 2025: Anemia Policy Brief.