Scholars Journal of Applied Medical Sciences
Abbreviated Key Title: Sch J App Med Sci
ISSN 2347-954X (Print) | ISSN 2320-6691 (Online)
Journal homepage: https://saspublishers.com

OPEN ACCESS

Paediatrics & Neonatology

The Risk Factors of Anaemia among Children of 6 Months to 59 Months – An Observational Study

Dr. Rawshan Ara[1*], Dr. Yasir Rahman[2], Dr. Alamgir Ahmed[3], Dr. Fauzia Nahid [4], Dr. Jesmine Akter Mitu[1]

[1]Specialist, Department of Paediatrics & Neonatology, Bangladesh Specialised Hospital, Dhaka, Bangladesh
[2]Additional Director, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh
[3]Assistant Professor, Department of Clinical Pathology, Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh
[4]Assistant Professor, Department of Pediatrics, Dhaka Central International Medical College and Hospital, Dhaka, Bangladesh

DOI: 10.36347/sjams.2023.v11i01.029 | **Received:** 06.12.2022 | **Accepted:** 19.01.2023 | **Published:** 26.01.2023

***Corresponding author:** Dr. Rawshan Ara
Specialist, Department of Paediatrics & Neonatology, Bangladesh Specialised Hospital, Dhaka, Bangladesh

Abstract **Original Research Article**

Introduction: Anemia is a common problem in childhood; especially children aged 6months to 59 months old. In Bangladesh overall, 68 % of children aged 6-59 months are anemic. Anemia impairs normal development, decreases physical exercise tolerance & intellectual performance in children which may lead to a slowdown of growth in children. It constitutes a major public health problem in young children in the developing world with wide social & economic implications. ***Aim of the Study:*** The aim of this study was to determine the risk factors of anaemia in children of 6 months to 59 months. ***Methods:*** This was a retrospective cross-sectional study and was conducted in the Department of Neonatology of Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh during the period from November, 2020 to February, 2021. ***Result:*** In total 50 patients completed the study. In our study we found majority were male 28(56%) and female 22 (44%) and 6-24 months of age were 52% (26), 24-36 months of age were 26% (13), 36-59 months of age were 22% (11). accordingly, the mean hemoglobin level was about 11.48 (±1.53) g/dL which ranged from 5.5 g/dL to 14.5 g/dL,(37.3%), were anemic and only 1 (5%) of them were found to be severely anemic, whereas male 28.5 % and female 26.3% were moderately anemic and (29%) were mildly anemic. most of the respondents given colostrum 38 (76%), exclusive breastfeeding were 38%, mixed feeding at 52% respectively, low birth weight or premature birth 31 (62%), prolonged breastfeeding were 24%,early weaning at 36% and socioeconomic status were 16% respectively. ***Conclusion:*** A large proportion of hospitalized children under five years of age were found anaemic, among them iron deficiency anaemia was most common. The study result emphasizes the importance of identifying the risk factors of anaemia in this age group. Raising awareness of the problem and providing health and nutrition education will be the key interventions to prevent and control this huge public health problem in Bangladesh.

Keywords: Risk factor, Anemia, Children, Implication.

INTRODUCTION

According to the World Health Organization (WHO), anemia is one of the ten most serious health problems in the world [1]. Frequently observed among children aged 6 to 59 months and in pregnant women who are the most vulnerable group [1, 2]. It corresponds to a state in which the number of red blood cells is low, or their ability to carry oxygen (i.e. hemoglobin) is so poor, in order to satisfy the physiological needs of the organism. In 2011, the WHO estimated that about 273.2 million children aged from 6 to 59 months in the world were suffering from anemia, with an overall prevalence of 42.6% [2]. Anemia is defined as a reduction of the red blood cell (RBC) volume or as a hemoglobin level below 11.0 g/dl. Anemia is a common problem in childhood; especially children aged 6months to 59 months old. It has been estimated that among children below four years of age, 12% are anemic in developed countries and 51% are anemic in developing countries. In Bangladesh 64% of children aged 6-23 months and 42% of children aged 24-59 months are anemic. Another survey in Bangladesh conducted by national Surveillance Project (NSP) of Helen Keller International (HKI) in collaboration with the Institute of Public Health Nutrition (IPHN) in 2004 showed that, overall, 68 % of children aged 6-59 months were anemic [3]. However, this disproportionately affects the regions of the world. Sheltering approximately 84.5 million 6–59 months aged children suffering from anemia, Sub-Saharan Africa remains the most affected

region with a prevalence reaching 62.3%. The early treatment of anemia and its eradication are a public health goal as well as a major school challenge because it could not only improve growth, but also the intellectual capacities of children [4]. Indeed, the consequences of the anemia among preschoolers are serious and include: impairment of cognitive function, impaired motor development and growth, declining academic performance, decreased immune function which exposes children to infections, decreased responsiveness and activity and fatigue [5-8]. These can irreversibly compromise the future development of a child. This situation has awoken a particular interest both nationally and internationally, leading to the implementation of prevention programs through food fortification and intermittent iron supplementation [9, 10]. It constitutes a major public health problem in young children in the developing world with wide social & economic implications. Thus decreased physical exercise tolerance & intellectual performance have been associated with mild anemia, which may lead to a slowdown of growth in children. Anemia is commonly associated with nutritional deficiencies such as iron deficiency, the main factor responsible for microcytic anemia, while folate or vitamin B12 deficiencies are responsible for macrocytic anemia. Among the causes of anemia, iron deficiency anemia (IDA) is the most commonly recognized form of nutritional deficiency in developing & developed countries. According to the world health organization, IDA affects 43% of the world's children2 & according to UNICEF report, 2 billion people suffer from anemia worldwide & most of them have IDA, especially in underdeveloped / developing countries, where 40-50% of children under age 5 are iron deficient. This study designed to determine the prevalence of 2 anemia in 6months to 59 months old hospitalized children who were admitted due to some acute illness [11]. Anemia can adversely affect cognitive advancement, performance in school, physical and behavioral growth, and immunization ability of children against disease. It remains a major cause of mortality and morbidity in developing countries where resources to determine the underlying etiology remain poor. According to WHO the Asian region shows the highest number of people being affected with 58 % of the anemia burden exists for PreSAC. According to recent information from the South Asian region, the prevalence of anemia among children 6–35 months aged was about 79 % in India. In Nepal, the prevalence among children <5 years was 46 %. The national overall prevalence of Anemia in Bangladesh was approximately 51 % in 2011 [12].

Evaluation of etiology of anaemia is important to treat the underlying cause and decrease mortality. So, in this study we aimed to identify the risk factors associated with anaemia among children of 6 months to 59 months in a representative sample of Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh.

OBJECTIVES

a) General Objective:

i) To determine the risk factors of anaemia among children of 6 months to 59 months.

b) Specific Objectives:

i) To identify the socio-demographic characteristics of the respondents.
ii) To determine Hb level of the respondents.
iii) To find out the causes of anaemia of anemic patients.

METHODOLOGY & MATERIALS

This was a retrospective cross-sectional study and was conducted in the Department of Neonatology of Bangladesh Shishu Hospital & Institute, Dhaka, Bangladesh during the period from November, 2020 to February, 2021. In this study we included fifty children associated with anaemia.

These are the following criteria to be eligible for the enrollment as our study participants: a) Patients aged between 6 to 59 months; b)Patients with suspected anaemia; c) Patients admitted at our study place ; d) Patients who were allowed to participate in the study by their legal guardians; and a) Patients not being admitted at our study place; b) Patients with previous surgical history; c) Patients with any history acute illness (e.g., renal or pancreatic diseases, ischemic heart disease etc.) were excluded from our study.

Measurements of Hemoglobin Value

Anaemia was defined when Hb level was below <11 g/dL according to World Health Organization (WHO). Children were categorized as children with anaemia (Hb <11gm/dl) and children without anaemia (Hb≥11gm/dl). Anaemia was labelled as mild (Hb 1010.9gm/dl), moderate (Hb 7-9.9gm/dl), and severe (Hb <7 gm/dl).

Statistical Analysis

All data were collected from the Secondary data by registry book and quantitative data was expressed as mean and standard deviation and qualitative data was expressed as frequency distribution and percentage. Statistical analysis was performed by using SPSS 23 (Statistical Package for Social Sciences) for windows version 10. 95% confidence limit was taken. Probability value <0.05 was considered as level of significance. Before commencement of the study, ethical clearance was taken from the Institutional Review Board of Bangladesh Shishu Hospital & Institute.

RESULTS

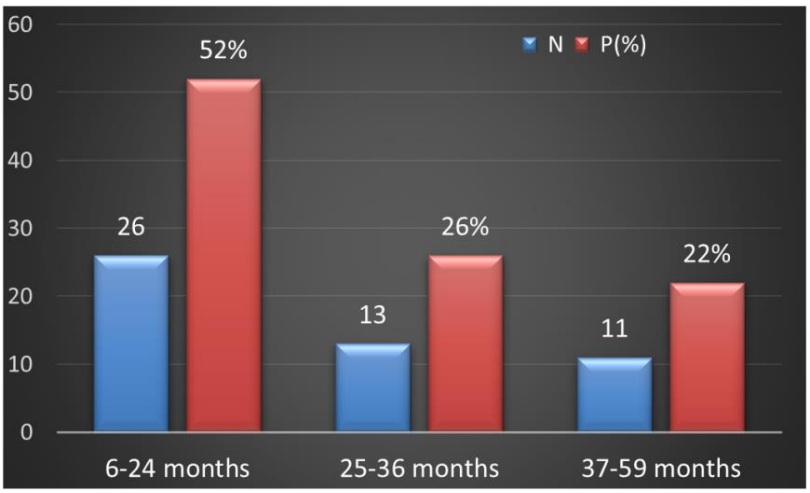

Figure 1: Age distribution among our study subjects

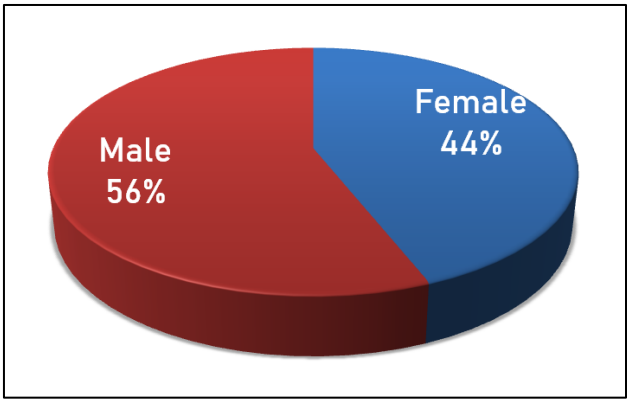

Figure 2: Distribution of study subjects based on gender

Table 1: Distribution of our study subjects based on maternal demographic variables

Maternal Factors	N	P(%)	P-value
Maternal age (years)			
15–24 years	29	58%	
25–34 years	16	32%	
35–49 years	5	10%	
Mean±SD	29.05±7.18		0.025
Education			
Illiterate	7	14%	0.002
Primary	31	62%	
Secondary & more	12	24%	
Occupation			
Housewife	28	56%	0.165
Teacher	12	24%	
Others	10	20%	
Maternal Anaemia			
YES	28	56%	0.001
NO	22	44%	
Household wealth index			
Poor	24	48%	0.241
Middle	18	36%	
Rich	8	16%	

Table 2: Distribution of respondents based on hemoglobin level, feeding history & stunting

Variables	N	P(%)	P-value
Hemoglobin Value			
<7g/dl (Severely Anaemia)	3	6%	0.012
7-9.9g/dl(Moderate Anaemia)	15	30%	
10-11.9g/dl (Mildly Anaemia)	24	48%	
≥11g/dl (Normal)	8	16%	
Feeding history			
Colostrum given	38	76%	0.002
Exclusive Breastfeed	19	38%	
Mixed Feeding	26	52%	
Prolonged breast feeding	11	22%	
Stunting			
Stunted	29	58%	0.002
No stunted	21	42%	

Table 3: Distribution of our study subjects based on the risk factors of anaemia

Factors	N	P(%)	P-value
Low birth weight/ premature birth	31	62%	0.001
Iron deficiency	22	44%	
Prolonged breastfeeding	12	24%	
Early weaning	18	36%	
Socioeconomic status	8	16%	

In figure 1 we showed the age distribution of our respondents. Among 50 respondents, majority (26) 52% were 6-24 months of age, followed by 25-36 months of age were (13) 26% & 37-59 months of age were (11)22% respectively.

In figure 2 we showed the distribution of respondents based on gender. Majority of patients were male 28(56%) and female 22 (44%).

In table 1 we distributed our study subjects based on maternal demographic variables. Majority (58%) were 15- 24 years old. The Mean±SD of maternal age was 29.05±7.18 years. Majority (62%) of them got primary education. In our study 56% were housewife, 24% were teachers, 56% had anaemia, 48% & 36% were poor & middle respectively.

Table 2 showed the distribution of respondents based on hemoglobin level, feeding history & stunting. We found that majority (48%) had mildly anaemia, 30% had moderate anaemia, 16% were normal and only 6% had severely anaemia respectively. Among 50 respondents, most of the respondents given colostrum 38 (76%), exclusive breastfeeding was 38%, mixed feeding was 52% respectively. Among all patients majority (58%) were stunted.

In table 3 we showed the distribution of respondents based on the risk factors of anaemia. Among 50 respondents, most of the respondents were low birth weight or premature birth 31 (62%), iron deficiency was 44%, prolonged breastfeeding was 24% and early weaning at 36% and socioeconomic status were 16% respectively.

DISCUSSION

In our study we found that majority (26) 52% were 6-24 months of age, followed by 25-36 months of age were (13) 26% & 37-59 months of age were (11)22% respectively [Figure 1]. Nambiema A *et al.*, included 2890 children aged 6–59 months were in their study. They found children aged 6–23 months were the most represented (36.3%) [13]. Oliveira *et al.,* studied 746 children aged 6 to 49 months from the state of Pernambuco, Brazil. They found mean age was around 28 months [14]. Gebreegziabher T *et al.,* studied children aged 6–24 months and 25–59 months, giving a weighted sample of 9794 children [15].

In the current study majority of patients were male 28(56%) and female 22 (44%) [Figure 2]. Nambiema A *et al.,* found the proportion of boys and girls in their study was respectively 1456 (50.4%) and 1434 (49.6%).[13] Oliveira *et al.,* found 50.9% male and 49.1% female in their study [14]. Gebreegziabher T *et al.,* found male 48·1% & 54·5% ,female 51·9% & 45·5% among 6-25 and 25-59 months respectively [15]. In our study majority (58%) of mothers were 15-24 years old. The Mean±SD of maternal age was 29.05±7.18 years. Majority (62%) of them got primary education. In our study 56% were housewife, 24% were teachers, 56% had anaemia, 48% & 36% were poor & middle respectively [Table 1]. Nambiema *et al.,* found majority 46.5% of mothers had no education, 85.5% were working, 42.8% had anemia history, 52.7%, 18.3% and 29.1% were poor, middle and rich respectively [13]. Shenton *et al.,* found that 29% of mothers had completed no education, while only 10% of mothers had completed secondary education or higher. Approximately 58% of mothers had full

decision-making autonomy in the household, while 7% had none; in contrast to the 26% and 40% of mothers with no and full decision-making autonomy, respectively in 2003 [16]. In our study we found majority (48%) had mildly anaemia, 30% had moderate anaemia, 16% were normal and only 6% had severely anaemia respectively. Among 50 respondents, most of the respondents given colostrum 38 (76%), exclusive breastfeeding was 38%, mixed feeding was 52% respectively. Among all patients majority (58%) were stunted [Table 2]. The overall prevalence of anemia among children aged from 6 to 59 months was 70.9% of which 25.6% had mild anemia, 42.7% had moderate anemia and 2.6% had severe anemia [13]. Shenton *et al.*, found that 40% of Ghanaian children aged 6–59 months had severe–moderate anemia in 2014 [16]. Adish AA *et al.*, found children aged 6–11 months were the most affected age groups with anemia prevalence of 53.2% which is almost three times higher than those aged 48–59 months (17.8%). This finding is similar to study findings done by Oliveira DN *et al.*, & Uddin MK *et al.*, [17-19]. In our study the higher proportion of anaemia was found among children with low birth weight or premature birth 31 (62%), iron deficiency was 44%, prolonged breastfeeding was 24%, early weaning at 36% and socioeconomic status were 16% respectively [Table 3]. A higher proportion of anemia was observed among children younger than 24 months (84.0%), malnourished (80.6%) and suffering from malaria (82.4%). We also observed higher proportion of anemia in children whose mothers suffered from anemia (75.8%) or had no education (74.2%) [13]. Kotecha *et al.*, & Neumann *et al.*, found the high prevalence of severe–moderate anemia in children under 2 years old appears related to poor maternal nutrition, as children born to malnourished mothers have poor stores of many essential micronutrients, such as iron, zinc, vitamin A and B12 and folate [20, 21], Saaka *et al.*, & Woldie *et al.*, found that complementary foods and feeding practices are especially important for determining the micronutrient adequacy of 6–23 months old children, as breast milk makes a progressively smaller contribution to an infant's nutritional requirements into late infancy and early childhood [22, 23]. Habicht *et al.*, & Simondon *et al.*, found that reverse causality may also underlie this association (i.e., smaller, malnourished children may be weaned later because of perceived vulnerability) [24, 25]. Villalpando *et al.*, found that infants also generally have a higher incidence of infectious diseases, which can reduce their ability to ingest and absorb iron, perhaps further explaining the higher prevalence of anemia among younger children [26]. Gebro *et al.*, found that a combination of child, maternal, household and community-level factors are contributing factors for the high prevalence of childhood anaemia in Ethiopia. The prevalence of anaemia was significantly different among regions, religious groups and area of residence. This could be due to differences in access to resources, level of education, cultural and dietary practices, as well as disparities in income level [27]. Mehrotra *et al.*, found that individuals living in rural areas and religion may contribute to the difference in the burden of anaemia. This difference was attributed to religion-based dietary differences [28].

Limitations of the Study

Our study was a single centre study. We could only study a few risk factors of anaemia because of our short study period. There are more factors like region, infectious diseases, religious status, cultural & dietary practices needs to be determined. After evaluating once those patients we did not follow-up them and have not known other possible interference that may happen in the long term with these patients.

Conclusion and Recommendations

In our study, we found that burden of anemia among children aged 6–59 months in the study area is higher. The risk factors like mother with no formal education, lowest wealth quintiles, having diarrhea before two weeks, poor dietary diversity scores, early and late introduction of complementary foods, sex and age of the child were significantly associated with anemia. Well integrated interventions to improve the health status and infant and young child feeding practices need to be prioritized to prevent deficiency of anemia targeting children aged under five years of age. Hence, further study with a prospective and longitudinal study design including larger sample size needs to be done to raise awareness of the problem and providing effective health and nutrition education in general to prevent and control this huge public health problem in Bangladesh.

References

1. Sanou, D., Turgeon-O'Brien, H., & Desrosiers, T. (2008). Prévalence et déterminants non alimentaires de l'anémie et de la carence en fer chez des orphelins et enfants vulnérables d'âge préscolaire du Burkina-Faso. *Nutr Clin Métabolisme*, 22(1), 10–9.
2. WHO. Haemoglobin concentrations for the diagnosis of anaemia and assessment of severity. Vitamin and Mineral Nutrition Information System. Geneva, World Health Organization 2011. (WHO/NMH/NHD/MNM/11.1 http:// www.who.int/vmnis/indicators/haemoglobin.pdf)
3. Onyemaobi, G. A., & Ikoku, A. (2011). Anaemia prevalence among under-five children in Imo State, Nigeria. *Australian Journal of Basic and Applied Sciences*, 5(2), 122–126.
4. Grantham-McGregor, S., & Ani, C. (2001). A review of studies on the effect of iron deficiency on cognitive development in children. *J Nutr.*, 131(2), 649S–68S.
5. Beard, J. L. (2001). Iron biology in immune function, muscle metabolism and neuronal functioning. *J Nutr.*, 131(2), 568S–80S.

6. Lozoff, B., Smith, J. B., Clark, K. M., Gloria Perales, C., Rivera, F., & Castillo, M. (2010). Home intervention improves cognitive and social-emotional scores in Irondeficient anemic infants. *PEDIATRICS*, 126(4), e884–94.
7. McCann, J. C., & Ames, B. N. (2007). An overview of evidence for a causal relation between iron deficiency during development and deficits in cognitive or behavioral function. *Am J Clin Nutr.*, 85(4), 931–45.
8. Stoltzfus, R. J. (2011). Iron interventions for women and children in low-income countries. *J Nutr.*, 141(4), 756S–62S.
9. OMS. Directive: utilisation d'associations de micronutriments en poudre pour l'enrichissement à domicile de l'alimentation des nourrissons et des enfants de 6 à 23 mois. 2012.
10. Sylvetsky, A. C., Jefferds, M. E. D., De-Regil, L. M., & Dowswell, T. (2011). Intermittent iron supplementation for improving nutrition and developmental outcomes in children. In: The Cochrane Collaboration, editor. Cochrane Database of Systematic Reviews. *Chichester: John Wiley & Sons,* Ltd. https://doi.org/10.1002/14651858.CD009085.
11. Stoltzfus, R. J. (2001). Iron-defi ciency anemia: reexamining the nature and magnitude of the public health problem. Summary: implications for research and programs. *Journal of Nutrition*, 131(2S-2), 697S–700S.
12. Nguyen, P. H., Nguyen, K. C., Le, M. B., Nguyen, T. V., Ha, K. H., Bern, C., ... & Martorell, R. (2006). Risk factors for anemia in Vietnam. *Southeast Asian Journal of Tropical Medicine and Public Health*, *37*(6), 1213-1223.
13. Nambiema, A., Robert, A., & Yaya, I. (2019). Prevalence and risk factors of anemia in children aged from 6 to 59 months in Togo: analysis from Togo demographic and health survey data, 2013–2014. *BMC Public Health*, 19, 215.
14. Oliveira, M. A., Osório, M. M., & Raposo, M. C. (2007). Socioeconomic and dietary risk factors for anemia in children aged 6 to 59 months. *Jornal de Pediatria*, *83*, 39-46.
15. Gebreegziabher, T., Regassa, N., Wakefield, M., Pritchett, K., & Hawk, S. (2020). Disparities in the prevalence and risk factors of anaemia among children aged 6–24 months and 25–59 months in Ethiopia. *Journal of Nutritional Science*, 9, E36.
16. Shenton, L. M., Jones, A. D., & Wilson, M. L. (2020). Factors Associated with Anemia Status Among Children Aged 6–59 months in Ghana, 2003–2014. *Matern Child Health J*, 24, 483–502.
17. Adish, A. A., Esrey, S. A., Gyorkos, T. W., & Johns, T. (2011). Risk factors for iron deficiency anaemia in preschool children in northern Ethiopia. *Public Health Nutrition*, 2, 243–252.
18. Oliveira, D. N., Martorell, R., & Nguyen, P. (2011). Risk factors associated with hemoglobin levels and nutritional status among Brazilian children attending daycare centers in Sao Paulo city, Brazil. *Archivos Latinoamericanos de Nutricion*, 60(1), 23–29.
19. Uddin, M. K., Sardar, M. H., Hossain, M. Z., Alam, M. M., Bhuya, M. F., Uddin, M. M., & Rahman, M. J. (2010). Prevalence of anaemia in children of 6 months to 59 months in Narayanganj, Bangladesh. *Journal of Dhaka Medical College*, *19*(2), 126-130.
20. Kotecha, P. V. (2011). Nutritional anemia in young children with focus on Asia and India. *Indian Journal of Community Medicine: Ofcial Publication of Indian Association of Preventive & Social Medicine*, 36(1), 8–16
21. Neumann, C. G., Gewa, C., & Bwibo, N. O. (2004). Child nutrition in developing countries. *Pediatric Annals*, 33(10), 658
22. Saaka, M., & Galaa, S. Z. (2017). How is dietary diversity related to haematological status of preschool children in Ghana? *Food & Nutrition Research*, 61(1), 1333389
23. Woldie, H., Kebede, Y., & Tariku, A. (2015). Factors associated with anemia among children aged 6–23 months attending growth monitoring at Tsitsika Health Center, Wag-Himra Zone, Northeast Ethiopia. *Journal of Nutrition and Metabolism*, 2015, 928632.
24. Habicht, J. P. (2000). The association between prolonged breastfeeding and poor growth—What are the implications? *Advances in Experimental Medicine and Biology*, 478, 193–200
25. Simondon, K. B., Costes, R., Delaunay, V., Diallo, A., & Simondon, F. (2001). Children's height, health and appetite infuence mothers' weaning decisions in rural Senegal. *International Journal of Epidemiology*, 30(3), 476–481.
26. Villalpando, S., Shamah-Levy, T., Ramírez-Silva, C. I., MejíaRodríguez, F., & Rivera, J. A. (2003). Prevalence of anemia in children 1 to 12 years of age. Results from a nationwide probabilistic survey in Mexico. *Salud Publica de Mexico*, 4(Suppl 4), S490–S498.
27. Fantay Gebru, K., Mekonnen Haileselassie, W., Haftom Temesgen, A., Oumer Seid, A., & Afework Mulugeta, B. (2019). Determinants of stunting among under-five children in Ethiopia: a multilevel mixed-effects analysis of 2016 Ethiopian demographic and health survey data. *BMC pediatrics*, *19*(1), 1-13.
28. Mehrotra, M., Yadav, S., Deshpande, A., & Mehrotra, H. (2018). A study of the prevalence of anemia and associated sociodemographic factors in pregnant women in Port Blair, Andaman and Nicobar Islands. *Journal of family medicine and primary care*, *7*(6), 1288-1293.