

ASSOCIATION BETWEEN PEDIATRIC ANEMIA AND MATERNAL ANEMIA IN INDIA

Pediatric anemia should be addressed in continuity with maternal anemia. The strategy of reducing anemia needs a life course approach.

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Introduction

Pediatric anemia is a severe public health problem for India. In 2015-16, an estimated 58.6% children (6 to 59 months) in India were anemic (NFHS, 2015-16)¹. Recent estimates from NFHS 2019-20 indicates that the situation has likely to have worsened across several states. As such, pediatric anemia has a complex multifactorial etiology and is widely prevalent across all socioeconomic groups in India². Even among economically better-off households one in every two children is found to be anemic.

How to reduce the prevalence of pediatric anemia is a major policy concern? This warrants clear understanding of causal pathways and actionable interventions. The magnitude of the problem intensifies manifold because not all of the anemia burden is associated with nutritional causes. Presence of non-nutritional causes complicates the approach and planning towards anemia control. Nevertheless, iron-deficiency is identified as the leading cause of pediatric anemia in the Indian context³. Accordingly, policies and programmes have prioritized iron-supplementation strategies for reducing pediatric anemia. The coverage and uptake of these services can presumably have greater impact when these are delivered in continuity with maternal anemia control strategies.

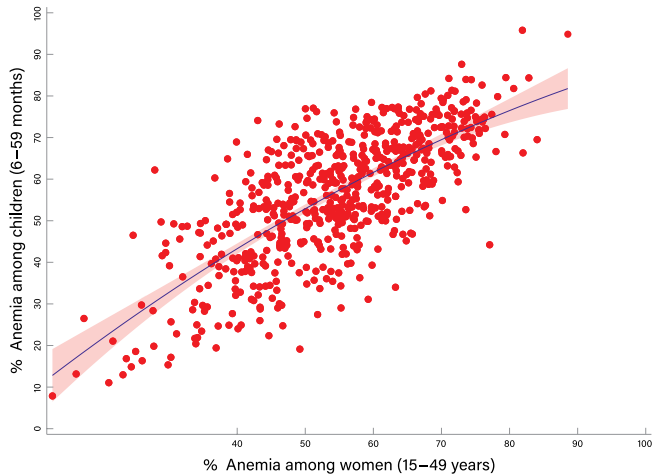
This note examines the association between prevalence of pediatric anemia and maternal anemia in India and argues for addressing this in a continuum of care approach.

Associations

An analysis of NFHS 2015-16 data reveals that districts with higher prevalence of maternal anemia also have higher levels of pediatric anemia (Figure 1). Nevertheless, this ecological association is marked with considerable heterogeneity. In other words, for a given district-level prevalence of maternal anemia, the prevalence of pediatric anemia shows considerable variations. This also calls for a scrutiny of individual-level associations.

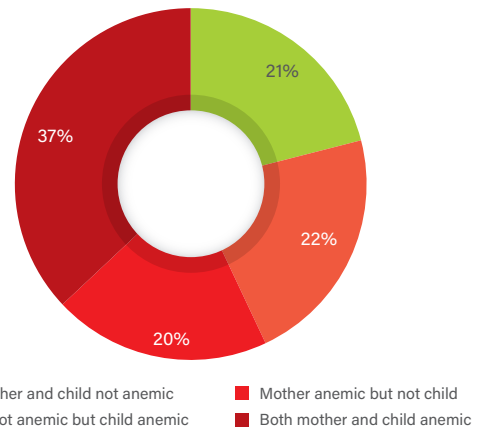
An analysis of anemia among mother-child pair reveals that in 37% cases both the mother and the child are anemic whereas only in 21% cases the mother-child pair is non-anemic. In 22% cases mother is not anemic but the child is anemic and in 20% cases mother is anemic but the child is not anemic. This finding reveals that 63% cases of pediatric anemia is directly associated with maternal anemia.

Figure 1: Association between district-level prevalence of pediatric and maternal anemia in India, NFHS 2015-16



Source: Authors based on NFHS 2015-16

Figure 2: Anemia prevalence in mother-child pair, NFHS 2015-16



Source: Authors based on NFHS 2015-16

Table 1: Joint probability of anemia among mother-child pair, NFHS 2015-16

Maternal Anemia	Pediatric Anemia			
	Severe	Moderate	Mild	None
Severe	0.001	0.004	0.002	0.002
Moderate	0.004	0.058	0.039	0.040
Mild	0.006	0.132	0.123	0.157
None	0.005	0.099	0.115	0.213

■ Both anemic ■ Either anemic ■ Both not anemic

Source: Authors based on NFHS 2015-16

1 International Institute for Population Sciences and ICF. National Family Health Survey (NFHS-4), 2015-16. 2017; Mumbai: International Institute for Population Sciences.
 2 Chaparro, C.M. and Suchdev, P.S., 2019. Anemia epidemiology, pathophysiology, and etiology in low-and middle-income countries. *Annals of the New York Academy of Sciences*, 1450(1), p.15.
 3 Sarna, A., Porwal, A., Ramesh, S., Agrawal, P.K., Acharya, R., Johnston, R., Khan, N., Sachdev, H.P.S., Nair, K.M., Ramakrishnan, L. and Abraham, R., 2020. Characterisation of the types of anaemia prevalent among children and adolescents aged 1-19 years in India: a population-based study. *The Lancet Child & Adolescent Health*, 4(7), pp.515-525.

The joint probability of pediatric anemia and maternal anemia is presented in Table 1. The probability of no anemia among both mother and children is 0.213. The probability of joint occurrence of severe anemia among both mother and child is 0.001. Moreover, the joint probability of moderate and mild pediatric and maternal anemia was 0.058 and 0.123 respectively. The probability of both jointly having some form of anemia is 0.369.

Table 2 shows a strong relationship between pediatric anemia and maternal anemia. Logistic regression based Odds Ratio (OR) reveals that children of severe anemic mother are three times more likely to be anemic (OR: 3.05, 95% CI 2.74-3.39) & (OR: 3.06, 95% CI 2.67-3.5) compared to non-anemic mother. From a policy prospective, it is important to note a strong association between pediatric anemia and consumption of 180 or more IFA tablets during pregnancy. The likelihood of pediatric anemia was less (OR: 0.87, 95% CI 0.84-0.91) among mothers who consumed IFA tablets for 180 days or more.

Policy Implications

Improve IFA consumption during pregnancy and lactation period

The Anemia Mukht Bharat (AMB) strategy adopts a holistic approach for addressing the prevalence and burden of anemia among mothers and children. Since its launch in 2018, AMB has ensured rapid increase in the coverage of IFA supplementation among mothers and children (www.anemiamukhtbharat.info). At the national level, IFA supplementation coverage among children (6-59 months) improved from 7% in 2017-18 to 15% in 2019-20. Among pregnant women, it improved from 78% in 2017-18 to 91% in 2019-20 and among lactating mothers, it improved from 34% in 2017-18 to 49% in 2019-20. However, despite improvements in IFA coverage the adherence to consumption is a challenge. Although, the coverage has improved but the overall consumption levels are inadequate to make a reasonable impact on anemia prevalence. Post-COVID recovery in service delivery is a critical area for engagements.

ASHA should be effectively engaged for improving consumption

The AMB guidelines have made provisions for ASHA incentives to promote IFA coverage and consumption. Given low-levels of adherence and consumption of IFA supplementation, it is important to encourage ASHAs to utilize various service delivery platforms including the home-based care programs for women and children to ensure greater consumption of IFA supplements. The dosage requirements currently does not allow for a monitored intake of IFA supplement through ASHAs as the number of beneficiaries are far greater than what could be covered through regular home visits. An alternate approach could substitute some of the IFA supplementation for severe and moderate anemia cases from prophylactic to treatment mode. Counselling of pregnant and lactating women on adherence of daily intake of nutritional diets in adequate quantity and side effects, compliance and safety of IFA supplementation is particularly of paramount importance for reducing of pediatric anemia.

Research Gaps

Anemia in general and pediatric anemia in particular has been an under-researched area. For instance, the prevalence and trajectory of pediatric anemia in the age group 0 to 6 months is less understood. Also, it is unclear how anemia prevalence (Hb levels) fluctuates during childhood. Also, how does the association between maternal and pediatric anemia vary with nutritional or non-nutritional causes of anemia? In this context, it is equally important to consider whether it is meaningful to advance toward anemia correction with a treatment rather than prophylactic approach for cases of both severe and moderate anemia.

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Table 2: Logistic regression based odds ratio of pediatric anemia for given status maternal anemia, NFHS 2015-16

Maternal anemia status	Model 1		Model 2	
	Odds Ratio	[95% CI]	Odds Ratio	[95% CI]
Not anemic [®]				
Mild	1.59***	[1.55, 1.62]	1.58***	[1.54, 1.62]
Moderate	2.35***	[2.28, 2.42]	2.34***	[2.26, 2.43]
Severe	3.05***	[2.73, 3.40]	3.06***	[2.67, 3.50]
Consumption of IFA tablets				
Not taken [®]				
IFA<180	-	-	0.92***	[0.89, 0.94]
IFA>=180	-	-	0.87***	[0.84, 0.91]

Note: P <0.01***, P <0.05** and * <0.10, [®] = Reference

Source: Authors based on NFHS 2015-16. Both the models are adjusted for age-sex of the child and the state of residence