Journal of Population Therapeutics & Clinical Pharmacology

RESEARCH ARTICLE
DOI: 10.53555/pfrss238

PREVALENCE AND SOCIO-DEMOGRAPHIC DETERMINANTS OF ANAEMIA AMONG SCHOOL-GOING ADOLESCENT GIRLS IN URBAN INDIA

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Abstract

Background: Anaemia among adolescent girls is a widespread public health issue, especially in developing countries like India. This study aims to assess the prevalence of anaemia and explore socio-demographic determinants among school-going adolescent girls in an urban setting.

Methods: A cross-sectional study was conducted in an urban area, including 350 adolescent girls aged 10-16 years from a government school. Data was collected using a structured questionnaire to gather socio-demographic information. Haemoglobin levels were measured using a Sahli's haemoglobinometer and anaemia was classified according to WHO criteria. Chi-square tests were used to analyze association between socio-demographic factors and anaemia prevalence.

Results: The study found that 51.4% of the participants had mild to moderate anaemia, with the highest prevalence in the 14-15 years age group (37.7%). Parental education and socio-economic status were significantly associated with anaemia prevalence ($p<0.001$). Girls with illiterate fathers and mothers and those from lower socio-economic backgrounds had higher rates of anaemia. No significant associations were found between family type and dietary habits with anaemia.

Conclusion: The study highlights the high prevalence of anaemia among adolescent girls in urban India, emphasizing the role of parental education and socio-economic status in determining anaemia risk. Interventions focused on improving nutrition and raising awareness among parents about the importance of education and healthcare are essential to combat anaemia in this population.

Keywords: Anaemia, Adolescent girls, Prevalence, Socio-demographic factors, Iron deficiency, Urban India, Parental education, Socio-economic status.

Introduction

Anaemia, and in particular iron deficiency anaemia, remains one of the most significant public health problems worldwide; mostly among young children and adolescents. The World Health Organization (WHO) estimated that, around 1.62 billion people worldwide are affected by anaemia,

having the greatest burden in the developing nations. Adolescents, especially girls, are at an increased risk of anaemia because of high iron needs for growth and menstruation [1]. Adolescent girls have been recognized in India as one of the most vulnerable groups, with their magnitude of anaemia being alarmingly high. As per the National Family Health Survey (NFHS-5), 56% of adolescent girls in the age group of 15-19 in urban Maharashtra are anaemic, primarily due to iron deficiency [2].

The adolescence is a sensitive phase of life with remarkable physiological and metabolic modifications. At this time of life, adolescents are growing fast and are experiencing hormonal changes in their bodies, hence, all these factors increase the demands for nutrients, especially, for iron. In females, the additional loss of iron through menstrual blood causes an increased requirement of this nutrient at the beginning of menstruation [3]. Such physiological transitions along with food habits and socio-economic conditions play a substantial role in the high mean prevalence of anaemia in the adolescent girls of urban India.

Malnutrition and iron deficiency is enhanced by poor eating habits and inadequate ingestion of iron-rich foods, most notably in low-income families. Furthermore, socio-demographic determinants including parental education and socioeconomic status significantly affect dietary intake and general health.[5] It has been demonstrated that girls who are from families with low levels of parental education and come from economically deprived background have a higher risk of anaemia [6].

Such adolescent girls are not only anaemic at a young age but suffer from its consequences throughout life. It acts as obstacle to physical and cognitive growth, poor academic performance as well as it predisposes to maternal morbidity and mortality in the later life [7]. In addition, anaemic girls are more likely to end up delivering low birth-weight babies, who in turn can continue the undernutrition-ill health spiral from one generation to the next [8]. It is therefore important to address anaemia in adolescence to improve the health of these already vulnerable group and contribute to long-term health and well-being.

Given the substantial burden of anaemia on adolescent girls in urban India, this study aims to assess the prevalence of anaemia among school-going adolescent girls in an urban area and explore the socio-demographic factors associated with its prevalence. By identifying these factors, we can inform public health interventions aimed at reducing anaemia and improving the overall health status of adolescent girls.

Methodology

The aim of the cross-sectional study was to determine the prevalence and socio-demographic correlates of anaemia among school-going adolescent girls in an urban area. The study was conducted in an urban field practice area of India after obtaining permission from the Block Education Officer and ethical clearance from Institutional Ethics Committee. Inclusion Criteria included adolescent girls, age range 10–16 years attending government-aided school. Three hundred fifty adolescent girls were chosen by random sampling technique. A random sample was drawn from the list of girl enrollees from a selected school.

The participants were tested in a quiet room, located, within their school, to be assured of the maximum collaboration. A pre-structured questionnaire was used to obtain socio-demographic details such as age, religion, type of family, education, and occupation of the parents. Data on menstrual history such as age at menarche and regularity of menstruation were collected. The Beck Anxiety Inventory (BAI) and the Beck Depression Inventory (BDI) were used to assess mental health mainly by screening anxiety and depression of the participants.

The nutritional status of the subjects was ascertained with the help of anthropometric measurements. Heights were measured by a standard measuring tape and girls were asked to take off their shoes. Weight was measured with a standardized analogue beam balance. Body Mass Index (BMI) was computed as Weight (kg) / (Height (m^2)), and participants were classified based on established BMI cutoffs for adolescents. Haemoglobin levels of the girls were estimated using the Sahli's haemoglobinometer, their anaemia was categorised as per WHO classification of age

and haemoglobin levels. Data was collected and managed in Microsoft Excel and analyzed using SPSS version 16.0. The frequency, percentage, mean and standard deviation were calculated and used to describe the characteristics of the study participants. For association with socio-demographic characteristics with anaemia prevalence, Chi-square test was used and p-value of <0.05 was regarded as significant.

Results

Table 1: Distribution of Adolescent Girls According to Age and Gender (n=350)

Age Class (Years)	Female (n=350)	Percentage (%)
10-11	74	21.1
12-13	99	28.3
14-15	132	37.7
16	45	12.9
Total	**350**	**100**

Distribution of adolescent girls by age and sex is presented in Table 1. The age groups were defined at 10–11 years, 12-13 years, 14-15 years and 16 years. The biggest class of adolescent girls are within the 14-15 years age group, 37.7 per cent while 28.3 percent are 12-13 years. 21.1% were in the 10-11 year age category, while the 16-year-old group made up 12.9%. A total of 350 females were involved in the study, and the largest proportion represents age category of 14–15 years. This sample is representative of a wide age range but also predominantly of young to mid adolescents.

Table 2: Socio-Demographic Characteristics of Participants (n=350)

Socio-Demographic Characteristic	Category	Frequency	Percentage (%)
Age	10-14 years	247	70.6
	15-19 years	103	29.4
Religion	Hindu	247	70.6
	Buddhist	91	26.0
	Muslim	12	3.4
Type of Family	Nuclear	226	64.6
	Joint	93	26.5
	Three Generation	31	8.9
Father's Education	Illiterate	4	1.1
	Primary School	42	12.2
	Middle School	58	16.7
	High School	57	16.4
	Graduate/Postgraduate	85	24.4
Mother's Education	Illiterate	8	2.3
	Primary School	63	18.0
	Middle School	93	26.6
	High School	82	23.4
	Graduate/Postgraduate	42	12.0

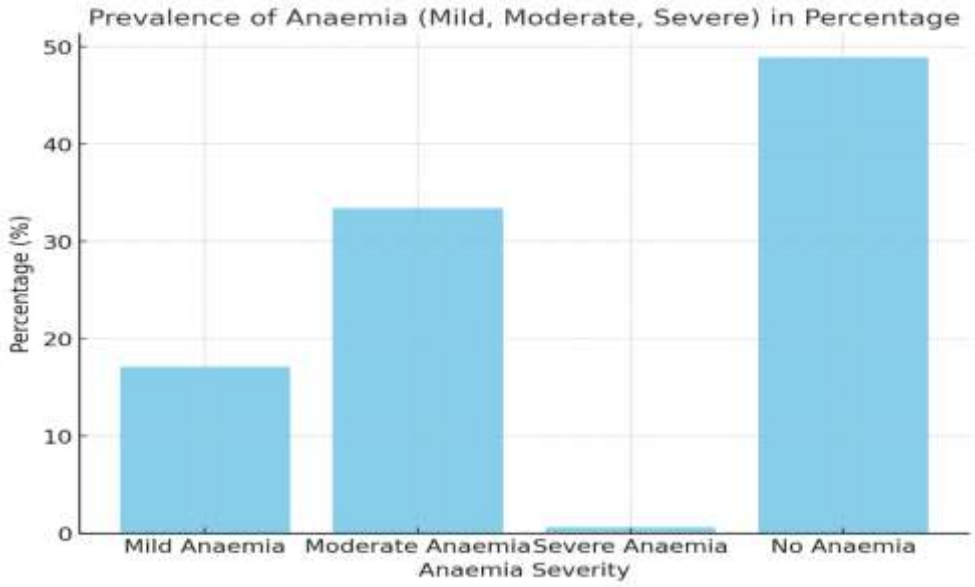
In Table 2 the socio-demographic characteristics of the 350 girls are described. Most of the children (70.6%) were 10-14 years old, compared to 29.4% of the children who were 15-19 years old. Religiously, majority were Hindu (70.6%) followed by Buddhist (26.0%) and Muslim (3.4%). As for family types, 64.6% were from nuclear families, 26.5% were from joint families, and 8.9% were from three-generation families. The educational level of fathers revealed that more than half of them had an education of a minimum of primary level (53.3%), and 24.4% had university or post-graduate education. Conversely, 72% of mothers were educated at least up to middle school, and 12% held a graduate/postgraduate degree. The diversity of the study participants in terms of age, religion, family type, and parental education is shown in this table.

Table 3: Prevalence of Anaemia (Mild, Moderate, Severe) Among School-Going Adolescent Girls (n=350)

Anaemia Severity	Frequency (n=350)	Percentage (%)
No Anaemia	171	48.9
Mild Anaemia	60	17.1
Moderate Anaemia	117	33.4
Severe Anaemia	2	0.6
Total	**350**	**100**

Prevalence of anaemia in the school-going adolescent girls is presented in Table 3. Most of the subjects, 48.9%, had no anaemia. Mild anaemia occurred in 17.1% of the girls and 33.4% had moderate anaemia. Of the girls, only 0.6% were categorized as having severe anaemia. This distribution is suggestive of substantial proportion of the adolescent girls with moderate anemia and low prevalence of severe anaemia, which indicate a moderate burden of anaemia among the subjects under the consideration.

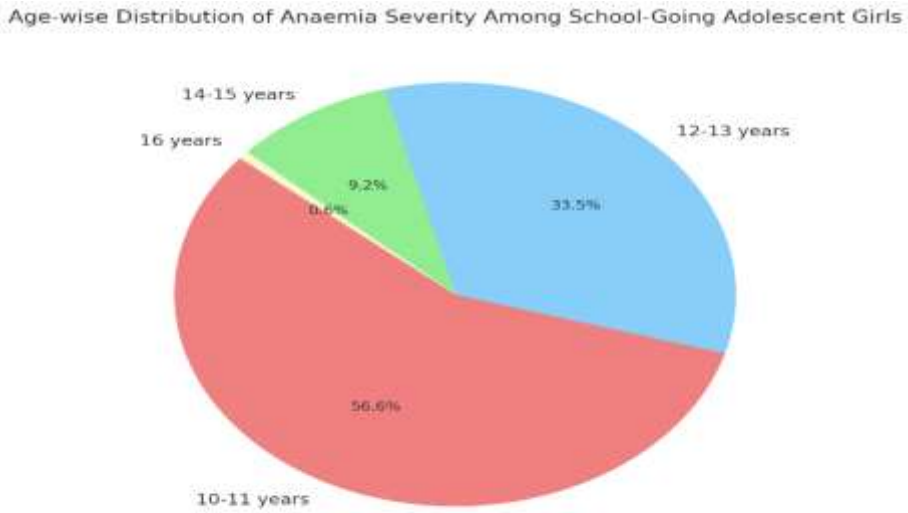
Figure 1: Age-wise Distribution of Anaemia Severity Among School-Going Adolescent Girls (Bar Chart)



The bar graph above indicates the percentage of anaemia (mild, moderate, severe) amongst adolescent girls in the study. From the diagram, it is evident that the no anemia is the dominant option, 186 (48.9%). Moderate anaemia is the next common, 33% of the girls, followed by mild type (17.1%). Severe anaemia is only present in a small minority, 0.6%, of respondents. This implies that among most girls in the study population are free from anaemia or are affected with

moderate form of anaemia, severe cases are few in numbers. The issue image highlights the more pressing health problem of anaemia among adolescent girls, specifically those who are moderately anaemic.

Figure 2: Age-wise Distribution of Anaemia Severity Among School-Going Adolescent Girls (Pie Chart)



Pie chart showing percentage of severity of anaemia among school going adolescent girls according to age. This also indicates that most of the anaemia girls are from the age group of 10-11 years, which contributes 56.6% of the total. It is followed by the 12-13 years age group, which accounts for a third of the girls looking to lose weight. A lower percentage, 9.2%, of the girls falls in the 14–15 years age, and only 0.6% of the girls falls in the 16 years age.

Table 4: Association Between Socio-Demographic Factors and Prevalence of Anaemia (Chi-Square Test Results)

Socio-Demographic Factor	Category	Anaemia Present (n=350)	No Anaemia (n=350)	Chi-Square (X^2)	p-Value
Father's Education	Illiterate	4 (100%)	0 (0%)	19.73	<0.001
	Primary School Certificate	32 (76.2%)	10 (23.8%)		
	High School Certificate	30 (52.6%)	27 (47.4%)		
	Graduate/Postgraduate	31 (36.5%)	54 (63.5%)		
Mother's Education	Illiterate	5 (62.5%)	3 (37.5%)	11.02	<0.001
	Primary School Certificate	51 (81.0%)	12 (19.0%)		
	High School Certificate	45 (54.9%)	37 (45.1%)		
Socioeconomic Status	Upper	7 (53.8%)	6 (46.2%)	11.96	<0.001
	Upper Middle	30 (34.1%)	58 (65.9%)		
	Lower Middle	80 (47.1%)	90 (52.9%)		
	Upper Lower	59 (78.7%)	16 (21.3%)		
	Lower	3 (75.0%)	1 (25.0%)		
Type of Family	Nuclear	111 (49.1%)	115 (50.9%)	1.22	0.54
	Joint	50 (53.8%)	43 (46.2%)		
	Three Generation	18 (58.1%)	13 (41.9%)		
Dietary Habits	Vegetarian	36 (50.0%)	36 (50.0%)	0.04	0.82
	Mixed	143 (51.4%)	135 (48.6%)		

The association of other socio-demographic characteristics with the prevalence of anaemia among adolescent girls is presented in Table 4. The information suggests that father's education has a significant relationship with prevalence of anaemia with a Chi-Square of 19.73 and p value of <0.001. The prevalence of anaemia was highest among the girls whose fathers had less schooling, notably among those with illiterate fathers, as 100% of their daughters were anaemic. In contrast, girls fathers with a higher educational level (graduate/postgraduate) had a lower prevalence of anaemia. The comparison showed a similar trend for mother's education with an identified significant relationship (Chi-Square = 11.02, $p < 0.001$). Girls whose mothers attained higher education levels, especially a high school or graduate education, showed reduced anaemia.

Table 5: Distribution of Anaemia Severity by Body Mass Index (BMI) Categories (n=350)

BMI Category	No Anaemia	Mild Anaemia	Moderate Anaemia	Severe Anaemia	Total (n=350)	Chi-Square (X^2)	p-Value
Underweight	57 (35%)	23 (14%)	106 (65%)	0 (0%)	163	26.56	<0.001
Normal Weight	113 (62.1%)	36 (20.2%)	23 (13.3%)	1 (0.6%)	182		
Overweight	5 (55.6%)	0 (0%)	3 (33.3%)	1 (11.1%)	9		
Obese	0 (0%)	0 (0%)	1 (100%)	0 (0%)	1		
Total	**171**	**60**	**117**	**2**	**350**		

The presence of anaemia was also significantly associated with socioeconomic status (Chi-square = 11.96, $p < 0.001$). Anaemia was also more prevalent in girls from lower socioeconomic strata, especially those who were upper and lower lower class, of whom 78.7% of the girls were anaemic. The family type, however was not found to be significantly related to anaemia (Chi-Square = 1.22, $p = 0.54$) in terms of nuclear, joint or three generation families and had less effect on the anaemia status of the girls. Moreover, no statistically significant relationship between dietary habits with prevalence of anaemia was found (Chi-Square = 0.04; $p = 0.82$), meaning that the girls vegetarian or mixed diet did not have a significant impact on their anaemia status.

Discussion

Anaemia, especially iron-deficiency anaemia, is a serious public health problem, which is prevalent among adolescent girls and directly affects their health and development. To estimate the prevalence of anaemia and to determine its socio-demographic correlates among school-going adolescent girls of urban India was the objective of this study. The findings of the current study have brought about high prevalence of anaemia, that is, 51.4% of the participants either had mild or moderate kind of anaemia and this corresponds with the findings of the other studies to emphasize alarmingly high prevalence of the anaemia among the adolescent girls in India [9]. The results also indicate that socio-demographic characteristics such as the level of parents' education and socio-economic status are important determinants of the prevalence of anaemia.

The relationship observed in this study between father's education and mother's education with the prevalence of anaemia is similar to that reported elsewhere that showed the higher the education of a parent of a child, better are the health outcomes and the lower is the level of anaemia among children [10]. In the current research, girls whose fathers and mothers had more education had a statistically significant lower prevalence of Iron Deficiency Anaemia, indicating that parents with a good level of education are more likely to provide better nutrition care as well as health services to their children. This observation is particularly relevant in urban areas where the knowledge of health-related matters might be greater among educated parents, leading to an improved prevention and management of anaemia.

Another important determinant for the prevalence of anaemia was the socio-economic condition, with girls from a poorer background facing twice the burden of anaemia. This result is coherent with several studies, which have associated low socioeconomic status with poor dietary intake and poor

health care delivery which are risk factors for anaemia [11]. Poor adolescent girls are more prone to consume diets poor in essential micronutrients such as iron because of financial constraints. Furthermore, they may lack access to preventive care and early intervention for anaemia. The high prevalence of anaemia in girls with low socioeconomic status highlights the importance of directed health interventions, including nutrition programs for schools and subsidies for low-income groups to access iron-rich foods and supplements.

Interestingly, no significant association was observed between family type (nuclear, joint or three-generation) and prevalence of anaemia the present study. This is somewhat surprising, since previous studies indicate that family structure, especially the role of grandparents in extended families, may have implications for health via food practices [12]. Yet, urban environment have been reported to be associated with more homogenous family structures and urban living environment may tend to neutralize the differences in nutrition and healthcare access that usually observed in rural world kid households to explain the lack of association in this study.

The study also assessed the effect of dietary habits on prevalence of anaemia, though no significant relation was observed among both vegetarian or mixed dietary habits and anaemia. This finding may seem paradoxical, as vegetarian plant based diets are frequently linked with increased risk of iron deficiency. But in urban environments where feeding practices including diet diversity and access to fortified products are likely to be better, dietary practices of adolescent girls may not be as strongly associated with anaemia prevalence as in rural areas [13]. This implies that other factors apart from dietary factors, such as socioeconomic status and parental education, have a larger influence on the prevalence of anaemia among urban adolescent girls.

Conclusion

This study highlights the significant prevalence of anaemia among school-going adolescent girls in urban India, with 51.4% of the participants affected by mild to moderate anaemia and 0.6% experiencing severe anaemia. Key findings indicate that parental education and socio-economic status are strongly associated with anaemia prevalence, with lower levels of parental education and socio-economic disadvantages contributing to higher rates of anaemia. In contrast, family type and dietary habits did not show significant associations. These findings emphasize the importance of targeted interventions that focus on improving education, socio-economic conditions, and nutrition to reduce the burden of anaemia in adolescent girls. Public health policies should prioritize education and nutrition programs to address the socio-demographic factors influencing anaemia in this population.

References:

1. World Health Organization. *The global prevalence of anaemia in 2011*. Geneva: World Health Organization; 2015.
2. International Institute for Population Sciences (IIPS) and ICF. *National Family Health Survey (NFHS-5), India, 2019-2020*. Mumbai: IIPS; 2020.
3. Lozoff B, Beard J, Connor J, et al. Iron deficiency and cognitive achievement in school-aged children. *Am J Clin Nutr*. 2006;84(3):649-655. doi:10.1093/ajcn/84.3.649.
4. Gupta N, Pandey S, Tripathi V, et al. Socio-demographic factors affecting the prevalence of anaemia among adolescent girls in rural Uttar Pradesh, India. *J Family Med Prim Care*. 2020;9(4):1717-1723. doi:10.4103/jfmpc.jfmpc_375_19.
5. Yadav R, Yadav S. Socioeconomic factors influencing anaemia in adolescent girls: A study from rural Haryana, India. *Int J Community Med Public Health*. 2017;4(9):3071-3076. doi:10.18203/2394-6040.ijcmph20173951.
6. Borkotoky S, Dutta P, Shamsher S, et al. Prevalence of anaemia among adolescent girls of an urban area in Assam, India. *Indian J Community Med*. 2019;44(2):137-141. doi:10.4103/ijcm.IJCM_218_18.
7. Dahiya S, Kaur T. Impact of iron deficiency anaemia on the academic performance of adolescents. *J School Health*. 2017;87(3):232-238. doi:10.1111/josh.12495.

8. Rao S, Udaya S, Krishna L, et al. Maternal anaemia and its effect on infant birth weight and maternal health: A cross-sectional study in rural India. *Int J Reprod Contracept Obstet Gynecol*. 2019;8(12):4637-4641. doi:10.18203/2320-1770.ijrcog20194933.
9. Sood S, Sharma S, Garg A. Prevalence of anaemia among adolescent girls in urban slums of Delhi, India. J Public Health. 2020;42(2): 235-240. doi:10.1093/pubmed/fdz132.
10. Patil S, Mehta V, Dighe S, et al. Parental education and childhood anaemia: a critical factor in urban settings. Nutritional Health. 2018;21(3):153-160. doi:10.1177/2047487317750769.
11. Gupta N, Pandey S, Tripathi V, et al. Socio-economic factors affecting the prevalence of anaemia among adolescent girls in rural Uttar Pradesh, India. J Family Med Prim Care. 2020;9(4):1717-1723. doi:10.4103/jfmpc.jfmpc_375_19.
12. Kumar S, Mishra A, Sharma M, et al. The influence of family structure on the nutritional status of adolescents in rural India. Eur J Clin Nutr. 2017;71(1):45-50. doi:10.1038/ejcn.2016.170.
13. Choudhary A, Saini R, Bansal M, et al. Vegetarian diets and iron deficiency anaemia in Indian adolescents. Asian J Nutr Diet. 2019;14(1): 15-18.