



Socio-Cultural Risk Factors of Anemia among Children under Five Years of Age in District Muzaffarabad, Azad Jammu & Kashmir, Pakistan

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Authors' contributions

This work was carried out in collaboration among all authors. Author NH designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors SURSA and AA managed the analyses of the study and proofread the manuscript. Authors SA and SF managed the literature searches and data analysis. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/JPRI/2020/v32i3030911

Editor(s):

(1) Dr. Vivekkumar K. Redasani, YSPM's Yashoda Technical Campus, Dr. Babasaheb Ambedkar Technological University, India.

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(1) Shaghayegh Rahmani, Islamic Azad University, Iran.

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Complete Peer review History: <http://www.sdiarticle4.com/review-history/62641>

Original Research Article

Received 29 August 2020

Accepted 04 November 2020

Published 27 November 2020

ABSTRACT

Aims: This study is aimed to determine the prevalence of anemia and to analyze its socio-cultural determinants among under five children to devise targeted delivery plan for pharmaceutical interventions to combat anemia.

Study Design: To investigate the socio-cultural risk factors, a cross-sectional field survey was conducted to gather data from 384 women and their last child up to five years of age in Muzaffarabad district of Azad Jammu & Kashmir (AJK), Pakistan.

Methodology: A pretested interview schedule was constructed to collect socio-cultural characteristics of the women and their children. We use convenience sampling which is a non-probability sampling technique for data collection. Two government hospitals were selected for data and blood samples collection from respondents. We use univariate analysis for descriptive statistics and perform bivariate analysis to find the association of anemia with the socio-cultural risk factors. Binary logistic regression is used to calculate odd ratios and the corresponding 95% confidence intervals. The results were considered statistically significant for p-value <0.05.

Results: The overall prevalence of anemia is 47.7%, which is a severe health problem from public health perspective. Among anemic children 74(40.4%) are mildly anemic, 79(43.2%) are suffering from moderate and 30(16.4%) from severe anemia. Major risk factors of anemia include residential area, parental education, father's profession, lower family income, maternal knowledge about balanced diet and anemia.

Conclusion: It is concluded that anemia among under five children is a multifactorial problem and policymakers should devise targeted pharmaceutical interventions (iron and folic acid supplementation) to combat anemia.

Keywords: Anemia; children; Muzaffarabad; Pakistan; socio-cultural factors.

1. INTRODUCTION

Anemia is the deficiency of red blood cells (RBCs) in the blood from clinical perspective and it is the low hemoglobin (Hb) concentration in blood from public health perspective [1]. The deficiency of iron and other key nutrients such as vitamins A, C, B12, and B-complexed group, folic acid, niacin, pantothenic acid, amino acids and proteins which maintain hemoglobin (Hb) level can cause anemia [2,3]. According to WHO [4], anemia can be categorized into mild (5-19%), moderate (20–39%) and severe health problem (≥40%) from public health perspective. Iron deficiency anemia (IDA) is ranked as the 3rd leading cause of disability across the globe and 13th leading cause of the global disability adjusted life years [5].

Anemia affects 1.62 billion (24.8%) people across the globe [4]. It occurs at all stages of life, however, children under five years, pregnant and non-pregnant women are at high risk of developing anemia [4,6]. According to WHO 2011 estimates, approximately 800 million children and women are suffering from anemia [7]. The global prevalence of anemia among children of 6-59 months is 42.6%, half of which is attributable to IDA [7]. Highest prevalence of anemia among children is in African (62.3%) and south Asian regions (53.8%). Kejo et al. [8] highlighted that apart from other causes of anemia like blood loss and heredity or acquired diseases, vitamin A, and folate deficiency, poor feeding practices, nonconsumption of iron-rich foods are the significant contributors of anemia among children. Iron deficiency anemia (IDA) accounts for approximately 50% of all anemia

cases across the globe, among which women and under-five children are most vulnerable groups [7-8]. The childhood anemia is linked to impaired cognitive function, poor school performance, childhood mortality and morbidity [8-11].

According to WHO [7] estimates, anemia falls into severe public health category (prevalence 61%) among children aged 5-59 months in Pakistan. Habib et al. [12] reported that IDA is a moderate public health problem (33.3%) among children aged 6-59 months in Pakistan based on the data analysis derived from national nutritional survey 2011-2012. Low Hb, deficiency of vitamin A and zinc, wasting, underweight, stunting and food insecurity are prevalent among these children. The study highlighted that prevalence of anemia was high among the children who were youngest, growth restricted, living with food insecurity and their mothers were suffering from IDA. In another study, Harding et al. [13] reported that stunted (adjusted prevalence ratio [95% CI]: 1.10 [1.04–1.17]) and anemic mother's children (1.21 [1.17–1.26]) are more likely to be anemic.

Majority of studies conducted in Pakistan and AJK investigated the prevalence of anemia among women of reproductive age especially during pregnancy [10-11,14-17]. Furthermore, data are still lacking to determine the societal factors contributing to anemia among Pakistani children. Along with medical treatment, sociocultural factors play a pivotal role in keeping a person healthy and are important for understanding the causal association of society and anemia [16].

Considering the significantly high prevalence of anemia among under-five children in Pakistan, there is strong need to formulate effective evidence based preventive interventions. In order to design effective interventions to combat anemia among under five children, evidence is needed to know the socio-cultural risk factors (preventable) of this ailment. The aim of present study is to estimate the prevalence of anemia and determine its association with socio-cultural risk factors among under five children residing in district Muzaffarabad, AJK by conducting a cross-sectional study. Exploring the socio-cultural determinants of anemia among under-five children in the specific locations prior to implementation intervention will ensure the effectiveness of designed intervention for combating anemia.

2. MATERIALS AND METHODS

2.1 Study Design and Data Collection

The study was conducted in the district Muzaffarabad, AJK, Pakistan to determine the prevalence of anemia and to analyze its socio-cultural determinants among children under five years. A cross-sectional field survey is conducted to gather data from 384 women along with their last child up to five years from rural and urban settings. The sample size n is determined using formula $\frac{\chi^2 NP(1-P)}{d^2(N-1) + \chi^2 P(1-P)}$ [18], based on the assumptions: estimated 50% population proportion(P), 95% confidence interval (CI) for the prevalence rate and 5% marginal error (d). Using above mentioned parameters settings for the population size $N=545817$, the sample size n is 384.

The data are collected through field survey with the help of trained interviewers using a self-constructed interview schedule from mothers of the children. To improve data quality proper ordering of questions in the questionnaire, time and relevancy of questions and coding was done. Pilot testing was conducted to detect flaws in the interview schedule in terms of content, grammar and format. The interview schedule was modified by excluding the confusing questions and some new questions were added to meet the research objectives. Before starting field work for data collection, the interviewers were trained to understand the meaning and contents of the questions of the interview schedule. The field work was supervised by the researcher herself along with a faculty member.

The study was approved by the board of advanced studies and research Pir Mehr Ali Shah Arid Agriculture University Rawalpindi. We provide a brief description about purpose of the study to the respondents in local language and informed consent was taken for data collection. The respondents were asked questions about their sociocultural characteristics, for example age of the child, parental education, parental profession, parental and family income, family size, birth order of the child, household structure, type of sewerage system, maternal knowledge about anemia, its cause, symptom and preventive measures. We use convenience sampling which is a non-probability sampling technique used for data collection. The two hospitals, Abbas institute of medical sciences and combined civil and military hospital Muzaffarabad are selected for blood samples to screen the hemoglobin (Hb) level of the mother and her last child under the age of five years. Based on the WHO cutoffs values of Hb, children are categorized as severe, moderate, mild anemic and normal for Hb level ≤ 7.0 g/dL, 7.1-9.9 g/dL, 10-10.9 g/dL and ≥ 11 g/dL [1,19-20].

2.2 Data Analysis

We use statistical package for social sciences (SPSS) version 14.0 to prepare datasheet and for data analysis. This package has eased the researchers to store large volume of data on computers and has saves time and data analysis effort. SPSS is chosen because it is most widely used package in academia and business circles. It takes very short computational time even for a huge scale of data. It is a versatile package that allows many different types of analyses and adequately serves the research purposes [21]. The univariate analysis is used to estimate the frequency distributions and percentages of the socio-cultural contributors of anemia and to determine anemia prevalence among children. Bivariate analysis is used for determining the empirical relationship between two variables [22]. In this study, bivariate analysis is used to determine the empirical relationship between dependent variable (anemia) and independent variables (sociocultural factors of anemia). Logistic regression is used to calculate the odd ratio (OR) with corresponding 95% CI, which is the exponential function of regression coefficients [23]. A p -value < 0.05 is used as the level of statistical significance.

3. RESULTS

Table 1 shows the absolute and percentage distributions with corresponding 95% CI of 384 under five children based on the sociocultural factors. The population proportion from both urban and rural area is 50%. From a total of 384 study participants, majority 117(30.5%) are in the age group of 13–24 months. Regarding parental education majority of mothers 111(28.9%) are illiterate, whereas years of schooling of majority fathers 144(37.5%) are 9 to 12 years. The results show that fathers are more educated than mothers. Regarding parental profession majority of mothers 284(74%) are housewives and majority of fathers 162(42.2%) are government employees. The findings elucidate that fathers are ultimate bread winners for their families.

The family monthly income of majority 151(39.3%) children is in the range of PKR 10001-25000 and only 69(18.0%) are having more than PKR 50000. The findings highlight that majority of children are living in economically deprived families and have very little opportunities to acquire quality food and adequate healthcare. The birth order of majority children 184(47.9%) is first or second and majority 200(52.1%) are living in the joint families. Majority of children 227(59.1%) are living in the reinforced cement concrete (RCC) houses and the sewerage system in most of the residential area is closed. Majority 157(40.9%) are consuming pica and 54.2% reported that male members are given preference in food intake in their families. Majority of mothers do not have knowledge about the balanced diet (53.9%), anemia as a health problem (57.6%), anemia symptoms (74.5%), anemia causes (79.4%) and pharmaceutical interventions to prevent anemia (79.4%). Illiteracy may be one of the factors of poor maternal knowledge (MK) about anemia, its symptoms, causes and pharmaceutical interventions.

Fig. 1 shows the distribution of the study population on the basis of anemia severity determined based on the Hb level of the children. The overall prevalence of anemia is 47.7% and 52.3% are non-anemic. Among 201 anemic children, 74(40.4%) are mildly anemic, 79(43.2%) are suffering from moderate and 30(16.4%) from severe anemia. The findings aver that anemia among under five children is a severe health problem from public health perspective in the study area.

In Table 2, the association of sociocultural determinants with anemia severity among under

five children is shown. Anemia is highly prevalent among children residing in rural areas, especially prevalence of severe anemia is almost 3 times more in rural dwellers than those residing in urban areas. The results of bivariate analysis reveal that residential area, parental education, fathers profession, family monthly income, household structure, type of sewerage system, maternal knowledge about balanced diet, anemia symptoms, its causes and pharmaceutical interventions to prevent anemia are the sociocultural factors significantly associated with anemia in under five children. Our study did not show significant association of family type, birth order and family size with anemia among under five children, however, burden of anemia increased with the increase in birth order and family size.

In Table 3, the results of binary logistic regression are presented to identify the independent association of each socio-cultural risk factor with anemia. The results show that living in the urban area is associated with reduced odds of anemia in children (OR 0.21, 95% 0.14-0.33). The variation due to geographical locations and better socio-economic status may explain the reduced risk of anemia in the children residing in urban areas. The study revealed that odds of occurrence of anemia are less among children of educated parents. Compared to illiterate mothers reduced odds of anemia in children of educated mothers (OR =0.66 for 1 to 8 years schooling and OR= 0.45 for 9 to 12 and 12+ years of schooling) were found. Regarding fathers years of schooling reduced odds of anemia were found among children for 1 to 8 years (OR=0.63), 9 to 12 (0.41) and 12 +years (0.38) compared to children of illiterate fathers.

Overall, our study found that children of the families having low income are more likely to be anemic. The birth order and family size did not show significant association with anemia among under five children, however, burden of anemia among children increased with increase in birth order and family size. The study also found that children residing in closed sewerage system areas are at lower risk of developing anemia compared to the dwellers of open sewerage areas. The poor maternal knowledge about balance diet (OR 1.54), anemia symptoms (1.39), anemia causes (1.72) and pharmaceutical interventions to prevent anemia (1.87) are associated with higher odds of anemia among children in our study.

4. DISCUSSION

This study reported a high prevalence of anemia (47.7%) among under five children in the study area. The observed high burden of anemia could be due to deficiency of iron rich diet among under-five children associated with socio-cultural factors such as area of residence, parental education, economic wellbeing of parents, father's profession, type of household, provision of sewerage system, and maternal knowledge about balanced diet and anemia. The prevalence of anemia in our study is higher than in study 33.2% [12] and lower than in study 62.5% [13] and 53.7% [24]. The findings are consistent with anemia prevalence in Nepal 46.4% [13] and high compared to Kazakhstan 32.4% [25], Morocco 20.4% [26], Yemen 34.2% [27] and North Ethiopia 41.1% [7]. The difference can be attributed to different experimental settings, sample size, sampling techniques, variations in the geographical location and sociocultural characteristics of the children and their parents.

Considering the association of area of residence and anemia, our study revealed that children residing in rural areas were more likely to suffer from anemia. Contrary to our study, [12] found that children residing in urban areas were more likely to develop anemia in Pakistan. Our finding is supported by the study conducted in China, which indicated that children from rural areas are more likely to suffer from anemia [28]. Our study did not show significant association between age of children and anemia; however, prevalence of anemia was comparatively more among children aged 13 to 24 months. The prevalence of anemia in this age group is likely due to the factors such as early weaning, increased iron requirements for rapid growth, low consumption of iron rich food and limited dietary diversity reported by dos Santos et al [29].

Regarding the association of parental education and anemia, our findings reported that children of educated parents were less likely to develop anemia compared to children of illiterate parents. The findings of the study are aligned with the studies conducted in North-East Ethiopia [6] and China [28]. The lower odds of anemia in the children of educated parents may be due to the fact that education improves the knowledge about healthcare utilization and consumption of diverse food for enhancing the nutritional status of the children. Income and parental occupation are important indicators of socio-economic status in the society and are associated with utilization of adequate health services, consumption of nutritional food and better dietary plan. Our findings highlight that children residing in low income families are more susceptible to develop anemia. This finding is consistent with the study [13], reporting that anemia is highly prevalent among children of lower income quintiles in Pakistan. Furthermore, anemia was significantly associated with the father's occupation among children in our study. The children of government servants have lower prevalence of anemia compared to other professions. The birth order of the children and family size were not significantly associated with anemia in this study, however, anemia prevalence increased with the increase in birth order and family size. Our findings are supported by the studies that increase in birth order [30] and family size [31] are associated with increased risk of anemia among children. Regarding house and environmental factors, the current study reported that children living in mud house and open sewerage system areas are likely to be anemic. These results are supported by studies [32-33] that household type and living environment are the major contributing factors of anemia.

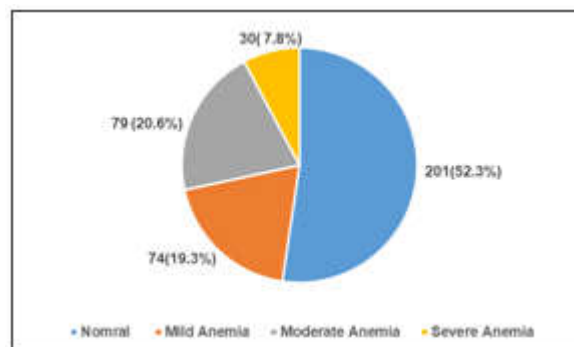


Fig. 1. Distribution of normal and anemic children (by severity) under five years

Table 1. Distribution of under five children based on the socio-cultural determinants of anemia in terms of frequency, percentages and 95% confidence interval (CI)

Variable	Groups	Frequency	Percentage	95% CI
Residence	Rural	192	50.0	45.0-55.0
	Urban	192	50.0	45.0-55.0
Age (months)	Up to 12	92	24.0	19.7-28.3
	13 to 24	117	30.5	25.9-35.1
	25 to 36	87	22.7	18.5-26.9
	36+	88	22.9	18.7-27.1
Mother's Education (years)	Illiterate	111	28.9	24.4-33.4
	1 to 8	85	22.1	17.9-26.3
	9 to 12	90	23.4	19.2-27.6
	12+	98	25.5	21.1-29.9
Father's Education (years)	Illiterate	58	15.1	11.5-18.7
	1 to 8	81	21.1	17.0-25.2
	9 to 12	144	37.5	32.7-42.3
	12+	101	26.3	21.9-30.7
Mother's profession	Housewife	284	74.0	69.6-78.4
	Government employee	68	17.7	13.9-21.5
	Self employed	24	6.3	3.9-8.7
	Others	8	2.1	0.7-3.5
Father's profession	Unemployed	8	2.1	0.7-3.5
	Government employee	162	42.2	37.3-47.1
	Self employed	124	32.3	27.6-37.0
	Others	90	23.4	19.2-27.6
Family income (PKR)	Up to 10000	77	20.1	16.1-24.1
	10001 to 25000	151	39.3	34.4-44.2
	250001 to 50000	87	22.7	18.5-26.9
	50000+	69	18.0	14.2-21.8
Birth order	1 or 2	184	47.9	42.9-52.9
	3 or 4	118	30.7	26.1-35.3
	4+	82	21.4	17.3-25.5
Family type	Nuclear	184	47.9	42.9-52.9
	Joint	200	52.1	47.1-57.1

Variable	Groups	Frequency	Percentage	95% CI
Family size	Up to 4	66	17.2	13.4-21.0
	5 to 8	191	49.7	44.7-54.7
	8+	127	33.1	28.4-37.8
Household structure	RCC	227	59.1	54.2-64.0
	Shelters	116	30.2	25.4-34.6
	Mud/Others	41	10.7	15.4-23.2
Sewerage system	Open	78	20.3	16.3-24.7
	Closed	306	79.7	75.7-83.7
Utilization of pica	Yes	157	40.9	36.0-45.8
	No	227	59.1	54.2-64.0
Male preference in food intake	Yes	208	54.2	49.2-59.2
	No	176	45.8	40.8-50.8
MK about balanced diet	Yes	177	46.1	41.1-51.1
	No	207	53.9	48.9-58.9
MK about anemia	Yes	163	42.4	37.5-47.3
	No	221	57.6	52.7-62.5
MK about symptoms	Yes	98	25.5	21.1-29.9
	No	286	74.5	70.1-78.9
MK about causes	Yes	79	20.6	16.6-24.6
	No	305	79.4	75.4-83.4
MK about pharmaceutical interventions to prevent anemia	Yes	77	20.1	16.1-24.1
	No	307	79.9	75.9-83.9

Maternal knowledge (MK)

Table 2. Association of sociocultural risk factors of anemia with its severity

Variable	Groups	Normal f (%)	Anemic f (%)			Chi- square
			Mild	Moderate	Severe	
Residence	Rural	69(35.9)	40(20.8)	61(31.8)	22(11.5)	67.06***
	Urban	139(72.4)	35(18.2)	10(5.2)	8(4.2)	
Age (months)	Up to 12	53(57.6)	16(17.4)	16(17.4)	7(7.6)	7.14 ^{ns}
	13 to 24	58(49.6)	25(21.4)	27(23.1)	7(6.0)	
	25 to 36	44(50.6)	21(24.1)	15(17.2)	7(8.0)	
	36+	53(60.2)	13(14.8)	13(14.8)	9(10.2)	
Mother's Education (years)	Illiterate	52(46.8)	26(23.4)	26(23.4)	7(6.3)	20.47*
	1 to 8	40(47.1)	19(22.4)	22(25.9)	4(4.7%)	
	9 to 12	51(56.7)	14(15.6)	13(14.4)	12(13.3)	
	12+	65(66.3)	16(16.3)	10(10.2)	7(7.1)	
Father's Education (years)	Illiterate	25(43.1)	12(20.7)	17(29.3)	4(6.9)	18.58*
	1 to 8	36(44.4)	22(27.2)	17(21.0)	6(7.4)	
	9 to 12	80(55.6)	23(16.0)	26(18.1)	15(10.4)	
	12+	67(66.3)	18(17.8)	11(10.9)	5(5.0)	
Mother's profession	Housewife	149(52.5)	62(21.8)	52(18.3)	21(7.4)	8.49 ^{ns}
	Government employee	43(63.2)	9(13.2)	10(14.7)	6(8.8)	
	Self employed	11(45.8)	3(12.5)	8(33.3)	2(8.3)	
	Others	5(62.5)	1(12.5)	1(12.5)	1(12.5)	
Father's profession	Unemployed	2(25.0)	4(50.0)	2(25.0)	0(0.0)	16.58*
	Government employee	98(60.5)	31(19.1)	22(13.6)	11(6.8)	
	Businessmen	66(53.2)	25(20.2)	26(21.0)	7(5.6)	
	Others	42(46.7)	15(16.7)	21(23.3)	12(13.3)	
Family income (PKR)	Up to 10000	32(41.6)	19(24.7)	17(22.1)	9(11.6)	18.70*
	10001 to 25000	80(53.0)	32(21.2)	34(22.5)	5(3.3)	
	250001 to 50000	51(58.6)	15(17.2)	11(12.6)	10(11.5)	
	50000+	45(65.2)	9(13.0)	9(13.0)	6(8.7)	
Birth order	1 or 2	109(59.2)	35(19.0)	27(14.7)	13(7.1)	8.22 ^{ns}
	3 or 4	61(51.7)	25(21.2)	21(17.8)	11(9.3)	
	4+	38(46.3)	15(18.3)	23(28.0)	6(7.3)	

Variable	Groups	Normal f (%)	Anemic f (%)			Chi- square
			Mild	Moderate	Severe	
Family type	Nuclear	100(54.3)	36(19.6)	32(17.4)	16(8.7)	0.59 ^{ns}
	Joint	108(54.0)	39(19.5)	39(19.5)	14(7.0)	
Family size	Up to 4	39(59.1)	11(16.7)	9(13.6)	7(10.6)	6.30 ^{ns}
	5 to 8	108(56.5)	38(19.9)	31(16.2)	14(7.3)	
	8+	61(48.0)	26(20.5)	31(24.4)	9(7.1)	
Household structure	RCC	139(61.2)	39(17.2)	32(14.1)	17(7.5)	16.72 [*]
	Shelters	56(48.3)	24(20.7)	26(22.4)	10(8.6)	
	Mud/Others	13(31.7)	12(29.3)	13(31.7)	3(7.3)	
Sewerage systems	Open	28(35.9)	23(29.5)	23(29.5)	4(5.1)	18.30 ^{***}
	Closed	180(58.8)	52(17.0)	48(15.7)	26(8.5)	
Male preference in food intake	Yes	102(49.0)	40(20.2)	44(21.2)	20(9.6)	5.94 ^{ns}
	No	106(60.2)	33(18.8)	27(15.3)	10(5.7)	
MK about balanced diet	Yes	106(59.9)	32(18.1)	22(12.4)	17(9.6)	10.21 [*]
	No	102(49.3)	43(20.8)	49(23.7)	13(6.3)	
MK about anemia	Yes	94(57.7)	33(20.2)	23(14.1)	13(8.0)	3.66 ^{ns}
	No	114(51.6)	42(19.0)	48(21.7)	17(7.7)	
MK about anemia symptoms	Yes	59(60.2)	21(21.4)	8(8.2)	10(10.2)	9.68 [*]
	No	149(52.1)	54(18.9)	63(22.0)	20(7.0)	
MK about causes	Yes	51(64.6)	15(19.0)	6(7.6)	7(8.9)	8.52 [*]
	No	157(51.5)	60(19.7)	65(21.3)	23(7.5)	
MK about Pharmaceutical interventions to prevent anemia	Yes	51(66.2)	15(19.5)	(7.8)	5(6.5)	8.77 [*]
	No	157(51.1)	60(19.5)	65(21.2)	25(8.1)	

Significance level: $\leq .05^*$; $\leq .005^{**}$; $\leq .0005^{***}$, ns (not significant), Maternal knowledge (MK)

Table 3. Sociocultural factors associated with anemia among under 5 children in district Muzaffarabad, AJK, Pakistan

Variable	Groups	Anemia f(%)		OR(95%CI)
		Yes, f (%)	No, f (%)	
Residence	Rural	123(35.9)	69(35.9)	1.00
	Urban	53(27.6)	139(72.4)	0.21(0.14-0.33)*
Mother's Education (years)	Illiterate	59(53.2)	52(46.8)	1.00
	1 to 8	45(52.9)	40(47.1)	0.66(0.37-1.19)
	9 to 12	39(43.3)	51(56.7)	0.45(0.25-0.82)*
	12+	33(33.7)	65(66.3)	0.45(0.26-0.78)*
Father's Education (years)	Illiterate	33(43.1)	25(43.1)	1.00
	1 to 8	45(55.6)	36(44.4)	0.63(0.37-1.08)
	9 to 12	64(44.4)	80(55.6)	0.41(0.22-0.74)*
	12+	34(66.7)	67(66.3)	0.38(0.20-0.75)*
Family income (PKR)	Up to 10000	45(58.4)	32(41.6)	1.00
	10001 to 25000	71(47.0)	80(53.0)	0.76(0.39-1.45)
	250001 to 50000	36(41.4)	51(58.6)	0.60(0.33-1.08)
	50000+	24(34.8)	45(65.2)	0.38(0.20-0.75)*
Type of Household	RCC	88(38.8)	139(61.2)	1.00
	Shelters	60(51.7)	56(48.3)	2.01(0.95-4.26)
	Mud/Others	28(68.3)	13(31.7)	3.40(1.67-6.91)*
Sewerage systems	Open	50(64.1)	28(35.9)	1.00
	Closed	126 (41.2)	180(58.8)	0.39(0.23-0.66)*
MK about balanced diet	Yes	71(40.1)	106(59.9)	1.00
	No	105(50.7)	102(49.3)	1.54(1.02-2.31)*
MK about anemia symptoms	Yes	39(39.8)	59(60.2)	1.00
	No	137(47.9)	149(52.1)	1.39(0.87-2.22)
MK about causes	Yes	28(35.4)	51(64.6)	1.00
	No	148(48.5)	157(51.5)	1.72(1.03-2.87)*
MK about pharmaceutical interventions to prevent anemia	Yes	26(33.8)	51(66.2)	1.00
	No	150(48.9)	157(51.1)	1.87(1.11-3.16)*

Significance level: < .05*; Maternal knowledge (MK)

Considering the association of the maternal knowledge of balanced diet, anemia causes and preventive measures, prevalence of anemia was found to be high among children, whose mothers had poor knowledge about these parameters. The utilization of balanced and diverse food, development of some health related behavior such as regular physical examinations, utilization of healthcare and use of iron supplementation can explain lower odds of anemia among children whose mothers had adequate knowledge about balanced diets and anemia.

5. LIMITATIONS OF THE STUDY

Despite of the fact our study provided an insight to the prevalence of anemia among under five children and major sociocultural contributors of this ailment in study area, however, this study suffers from some limitations. Due to cross-sectional nature of the study, we are unable to establish temporal relationship between anemia

and the associated contributing factors. We determine anemia based on the hemoglobin level and did not use broad screening tools to check hemoglobin level, hematocrit, red blood cell count, serum B12 and folate levels, and hence cannot measure different forms of anemia.

6. CONCLUSION

This study is conducted to explore the prevalence of anemia and to identify socio-cultural risk factors predisposing anemia among under five children in Muzaffarabad district of AJK, Pakistan. Anemia is a severe health problem from public health significance among children in the study area. The findings aver that area of residence, parental education, father's professions, family monthly income, types of houses and type of sewerage system are income related factors, which reveals that anemia among under five children is mainly due to poor socio-economic condition of the child's family. These

factors affect the consumption of balanced and diverse food, daily meal frequency, utilization of healthcare and pharmaceutical interventions, which lead to higher odds of anemia among children. In Azad Kashmir, government jobs are preferred due to the increased level of job security, but it is difficult for government to provide jobs at large scale. The policy makers need to take concrete measures to develop industrial sector, provide adequate investment opportunities in business sector, provide support to agriculture sector to increase food and cash crops yields as well as livestock production for improving the economic wellbeing of people. To alleviate negatives consequences of low income on anemia prevalence, people of marginalized areas should be helped out by launching income support programs. Furthermore, the vulnerable groups of children should be targeted with pharmaceutical interventions (iron and folic acid supplementation) for reducing anemia in Pakistan.

CONSENT AND ETHICAL APPROVAL

The study was approved by the board of advanced studies and research Pir Mehr Ali Shah Arid Agriculture University Rawalpindi. A brief description about purpose of the study was provided to the respondents in local language and informed consent was taken for data collection.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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