Factors associated with anemia among children 6-59 months in Ethiopia, using Ethiopia Demographic and Health Survey data, 2016

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Abstract

Background

Anemia is the most common nutritional problem and a wide spread micronutrient deficiency disorder even at global scale. In Ethiopia, child hood anemia is the most prevalent and a serious public health problem. The aim of this study is to assess determinants of anemia among children 6–59 months in Ethiopia, Ethiopia Demographic and Health Survey, 2016.

Method

This study was based on the 2016 Ethiopian Demographic Health Survey (EDHS).A community-based cross-sectional with a two-stage stratified cluster sampling technique was implemented at national level. Total of 7689 children were included in the analysis. Descriptive, bivariate and multivariable logistic regression analysis was employed.

Result

The prevalence of anemia among 6–59 months old children was 56.6% and highest among 6–11 months age groups. Child age 6–23 months, maternal age 20–29 and 30–39 years, poorest wealth index, mothers not currently living with husband, Birth order of the child eighth and, birth interval, one times, stunted children and underweight were significantly associated with anemia

Conclusions

The prevalence of anemia in this study was the highest from all EDHS reports. Itwas skyrocketed from the preceding report (EDHS 2011) and remains the main public health problem in Ethiopia. Comprehensive intervention strategies should be in place tailored to different government hierarchies (national, regional and district level) including household and individual level interventions for combating child hood anemia by giving an emphasis on the identified variables.

Background

Globally, anemia is the most common nutritional problem and wide spread public health micro-nutrient deficiency disorder that affects more than 2 billion people and according to the world health organization (WHO), it is one of the ten most serious health problems in the world[1, 2]. It affects both developed and developing countries with major consequences on human health as well as social and economic developments [3, 4].

Childhood anemia is a condition where a child has insufficient hemoglobin (less than 11 grams per deciliter (g/dL) level to provide adequate oxygen to the body tissues [5].In children, anemia results in low oxygenation of brain tissues, which in turn may lead to impaired cognitive function, growth, psychomotor development, leading to reduced academic achievement and earnings potential in their adulthood life [6].

It can occur at any time and at all stages of the life cycle[7].Even though relevant across the life span, anemia in under-five children is a special case given its significance to supporting a range of morbidities and mortality within this population subset[8].

The global prevalence of anemia among pre-school children according to the WHO database 1993-2005was 47.4% (affecting over 293 million children)[9].Study conducted in sub-Saharan Africa revealed that the prevalence of anemia among 6–59 month children was 59%,ranging from 23.7% in Rwanda to 87.9% in Burkina Faso [10].

In Ethiopia, child hood anemia is a serious public health problem. The trend of anemia among Ethiopian 6–59 months children declined from 54–44% from 2005 to 2011, but increased to 57% in EDHS 2016[11]. Many researchers have been conducted in Ethiopia to show its magnitude and associated factors. However, it showed a 30% increase (44–57%) from the preceding EDHS 2011 finding within five years period and remained the main public health problem in the country. Due to its multi factorial nature, correcting anemia often requires an integrated approach. Identifying and addressing the contributing factors could be an important step in order to design successful intervention strategies at national level.

However, most evidences come from small, unrepresentative samples and there is scarcity of solid and recent information showing the determinant factors of anemia among 6–59 months children at national level. In addition, the overall prevalence of anemia in the EDHS 2016 was 56.6% which never been reported from all previous EDHS reports. Since the prevalence of anemia in this study is the highest from all EDHS reports, further analysis and identification of the determinant factors is pivotal for designing appropriate intervention strategies at national level. Therefore, this study was designed to assess the determinants of anemia among children aged 6– 59 months in Ethiopia and to inform health authorities at different levels of the government hierarchies on the type of variables to be targeted and type of measures to be taken to prevent and control child hood anemia.

Methods

EDHS are periodical survey with five years interval, sometimes different from five with special cases. The 2016 EDHS is the fourth and the most recent DHS in Ethiopia, following the 2000, 2005 and 2011 EDHS surveys. The 2016 EDHS was conducted on a nationally representative sample of nine regions and two city administrations of the country. Subdivided into 68 zones, 817 districts and 16,253 kebeles (lowest local administrative units of the nation).

Finally, the number of live children 6 to 59 months, with hemoglobin data was considered in the final data analysis to identify the determinants of anemia among children in Ethiopia. In the 2016 EDHS data set, there were 8603childrenaged 6–59 months, of whom 914children were excluded from the analysis data due to missed hemoglobin data. The total number of 6–59 months children included in the final analysis were 7689.

Measurement and operational definition.

Anemia status was determined based on hemoglobin concentration in blood adjusted to altitude. Anemia was defined as occurrence of hemoglobin level of less than 11 g/dL. It was further categorized into mild, moderate, and severe anemia with a hemoglobin range of 10-<11 g/dl, 7-<10 g/dl, and < 7 g/dl respectively.

Study Design

Community based cross sectional study design was implemented at national level as one part of the periodic EDHS and we have extracted and analyzed the child hood anemia part from the EDHS2016.

The study population

Randomly selected children aged 6–59 months who have hemoglobin data in their data record in the archive of EDHS 2016 data.

Sampling technique

The 2016 EDHS data is already selected using a stratified, two stage cluster design, and enumeration areas were the sampling units for the first stage. In the first stage, 645 enumeration areas were randomly selected: 202 in urban areas and 443 in rural areas. In the second stage, a fixed number of 28 households per cluster were selected randomly for each enumeration areas. Of the 18,008 households were randomly selected and 16,650 (98% of response rate) households were eligible and interviewed. Additional information about the methodology of EDHS 2016 can be accessed in the report of the main findings of the survey published elsewhere (11).

Variables in the Study

The outcome variable

Anemia status of children aged 6 to 59 months.

Covariates Variables

To analyze the determinants of anemic among 6–59 month sold children, a number of socio-demographic, health, and socio economic factors like; maternal and paternal characteristics, childhood characteristics, household characteristics, and environmental conditions were assessed.

Data Analysis

After data were extracted, we have checked or its completeness and consistency and we did preliminary analysis. Weighted analysis was conducted using the same sampling weight given for each region in Ethiopia DHS to reimburse for the unequal probability of selection between the strata(11).Data analysis was carried out using STATA version v.14.Descriptive statistics was done to describe the data like frequencies and percentages.

Anemia status was determined based on hemoglobin concentration in blood adjusted to altitude. Adjusted concentration less than 11 g/dl was considered as anemic. Sample weights were applied to compensate for the unequal probability of selection between the strata, which has also been geographically defined for non-responses.

We use logistic regression method to identify determinants of anemia. Bivariate analysis was performed to see the crude association of each covariate variables with the outcome variable (anemia status).Those covariate variables with P-value less than 0.20 in the bivariate analysis were included in the final multivariable logistic regression analysis to adjust for confounding and to identify the final determinant of anemia among 6–59 month sold children. We use the backward logistic regression method during the multivariable logistic regression analysis. Before inclusion of predictors to the final logistic regression model, the multi-collinearity was checked using VIF < 10/Tolerance > 0.1 for continuous independent variables. The goodness of fit of the final logistic model was tested using Hosmer and lemeshow test at p value of > 0.05. Outcome measures have been indicated by odds ratio with 95% confidence interval. Finally, covariate variables with P-value of < 0.05 in the multivariable logistic regression model were considered as statistically significant variables in the final logistic model.

Ethical Considerations

The study proposal got ethical approval from Tigray health research institute and formal letter of permission was obtained from measure DHS project website to access the dataset (http://www.measuredhs.com).

Results

Characteristics of study participants

Data on 7689children between the ages of 6–59 months were included in the final analysis. The mean age of the children was 31.7 with a SD of +/-15.6 (median: 31 months, range: 6 to 59 months). There was uniform distribution of children by age with the lowest proportion of children (11.7%) found in the lowest age group of 5-11months.Ruraland urban representation of 83% and 17%, respectively. Around one fourth of the children 1826 (23.7%) were fourth and fifth birth order. The major number of households (45.3%) has two children and more than one-third (35.3%) of households had only one child with in the stated age range (Table 1).

Half of (49.8%) of mothers /caregivers of the children were within the age group of 20–29 years and around two third (65.1%) were Illiterate. More than two-third of the mothers (71.7%) were not currently working. More than one third (36.4%) of households were grouped under poorest rank of wealth index, and one from three mothers (33.2%) did not visit antenatal care during their recent pregnancy (Table 2).

Considering the nutritional status of the children, more than one third (39%) of the children were stunted, around one-quarter (26%) were underweight, and one-in ten (11.4%) were wasted. Nearly half (48.7%) of

the children were not received Vitamin A supplementation in last 6 months (Table 3).

Effect of maternal and child factors on anemia among Children Aged6–59 Months

The prevalence of anemia among children was 56.6%(with 22.5%, 30.4%, and 3.7% for mild moderate and severe anemia respectively).Mean hemoglobin concentration was 12.3 ± 1.9 g/lathe prevalence of anemia was slightly higher among males than females with a prevalence of 51.8% and 48.2% respectively (Fig. 1 and Table 1).The highest prevalence was reported in the lowest age range of 6–11 months with a prevalence of 78.2% and it steadily decreased as the age of the children increased. High prevalence of anemia was observed among children above third birth order (58.5%) than less than or equal to third birth order (Fig. 2). Highest prevalence of anemia also reported among mothers who gave first birth before 20 years (73.5%) and among mothers ageless than 25 years at the time of the survey (64.6%) (Fig. 3).Children with birth interval of less than 24 month and households having 5–6 children have highest anemia prevalence with67.7%, and 82.5%respectively (Fig. 4).

Factors Associated with Anemia among Children Aged 6–59 Months

In the bivariate logistic regression analysis age of child, sex, maternal age, residence, maternal educational status, number of house hold members, sex of house hold head, wealth index, currently living with husband, respondent currently working, birth order of the child, birth status, birth interval, number of ANC visit, deworming during pregnancy, recent diarrhea, vitamin A in last 6months, level of stunting, level of underweight, and level of wasting were significantly associated with anemia.

Multivariable logistic regression analysis was performed to identify statistically significant predictors of anemia (Table 4). In multivariable analysis children in the age group of 6–11, 12–23,24–35, 36–47 months were 6.2 times (AOR = 6.19; 95% CI: 4.62,8.30), 4.2 times (AOR = 4.20; 95% CI: 3.27,5.40),2.1 times (AOR = 2.15; 95% CI: 1.67,2.79) and 1.5 times (AOR = 1.49; 95% CI: 1.14,1.97)more likely to be anemic than children in the highest age range (48–59 months) respectively.

Children of mothers aged 20–29 and 30–39 years were 1.6 times (AOR = 1.64; 95% CI: 1.21, 2.23) and 1.3 times (AOR = 1.29; 95% CI: 1.01, 1.66) respectively more likely to be anemic than children of mothers in the highest age range (40–49 years).Considering wealth index of the households, children born from the poorest households were 1.5(AOR = 1.23; 95% CI: 1.23, 1.95) times more likely to be anemic than children from richest households. Children from mothers not currently living with husband were 1.3 times (AOR = 1.31; 95% CI: 1.02, 1.67) more likely to be anemic than children of mothers currently living with their husband.

Considering birth order of the child, children born in the order of eighth and above, sixth and seventh and fourth and fifth were 1.8 times (AOR = 1.79; 95% CI: 1.29, 2.49), 1.5 times (AOR = 1.50; 95% CI: 1.14, 1.98), and 1.4 times (AOR = 1.09; 95% CI: 1.09, 1.72) respectively more likely to be anemic than first birth order

children. The lower the birth interval, the higher the likely of developing anemia. Children with birth interval of less than 18 months,18–23 months, and 24–35 months were 1.7 times (AOR = 1.71; 95% CI: 1.26,2.34),1.6 times (AOR = 1.59; 95% CI: 1.22,2.07), and 1.4 times (AOR = 1.42; 95% CI: 1.17,1.73) respectively more likely to have anemia than children with birth interval of greater than or equal to 48 months.

Children of mothers with only 1 ANC visit were 1.5 times (AOR = 1.50; 95% CI: 1.02, 2.22) more likely to develop anemia than children of mothers with the recommended number of ANC visit (> = 4times).Stunted and underweight children were1.5 times (AOR = 1.47; 95% CI: 1.14, 1.88), and 1.4 times (AOR = 1.46; 95% CI: 1.04, 2.03) more likely to be anemic than normal children (Table 4).

Discussion

This study assessed the prevalence and associated factors of anemia among children aged 6 to 59 months in Ethiopia. Anemia in children is a major public health problem and most common causes of child death in Ethiopia [12].The overall prevalence of anemia was 56.6%.Even though high rate of breastfeeding has been reported in Ethiopia, breast milk is poor in iron content. Plant based food is commonly consumed in Ethiopia, which is low in iron content and poor in bioavailability due to phytate and other inhibiter [11].The magnitude of anemia reported in this study showed severe public health problem according to WHO classification [13].The present finding is in agreement with those of related studies done in developing countries. This finding was similar to study reported from Uganda58.8% [14] and Bangladesh national representative data 51.9% [15] and higher than study done in Gonder, Ethiopia (28.6%) [16] and Honduran (39%) among children [17].

However, the result of the present study is lower than studies conducted in Togo demographic and health survey 84.6%[18], and Ghana demographic and health survey 78.4% [19].The difference in the prevalence might be due to variation in sample size, socio-demographic status of parents, geographical location, sampling techniques, socioeconomic status and the diet consumed and other associated factors.

With an increase in child age, the risk of childhood anemia decreases in all age categories. The similar effect of the age of the child on anemia has been observed in the previous studies [15–16, 18–21].The possible reason for the elevated level of anemia with in younger age children might be low balanced nutritional intakes that may not be sufficient to satisfy the relatively higher iron requirement due to rapid growth [22]. Additional reason could be, younger children in Ethiopia mostly depends on breast milk, which is poor in iron content and the complementary food is entirely plant based which is poor in bioavailability and rich in absorption inhibiters like phytate. The other possible reason might be the poor infant and young child feeding practices [23] and perhaps childhood physiology was predominant that is children by 6 month of age their Iron stores are generally depleted while the blood volume doubles from 4 to 12 months after birth. Thus, the dietary sources of iron are very important to keep up with this rapid rate of red blood cell synthesis and anemia may result if the dietary sources are inadequate [24–25].

Children born from younger maternal age were high risk of childhood anemia this finding was consistent with the reports [26–27].This might be due to inattention to feed diversified foods for their children according to the recommended standard. Stunted and underweight children were more likely to be anemic than their counter parts. This finding is similar to studies conducted elsewhere[15, 21, 28–29].This could be due to anemia and under nutrition often have a synergism association in relation to socioeconomic status, sanitation, infections and parasitic diseases and diet in the same individuals [30].

Children from poorest households and illiterate mothers 1.6 times and 1.4 times respectively more likely to develop anemia than their richest counterpart and at higher education rank categories. It is in line with study in Bangladesh and Eastern Amhara, Ethiopia. Children from poor family and food in secure households were at higher risk of developing anemia than their counterparts [15, 29, 31]. In contrary children from the richest and middle-class households had a lower average hemoglobin concentration than those from the poorest households [32]. The reason could be, poorest households cannot afford iron rich animal based foods, and may have poor personal hygiene and environmental sanitation which leads to infection and micronutrient mal-absorption. Illiterate mothers lack knowledge on infant and young child feeding practice, and literacy can in turn affect the income earning capacity of mothers and their decision power on spending money. Illiteracy was positively associated with child hood anemia in agreement with previous studies [14, 18].This might be because educated mothers have better health and nutrition knowledge and child rearing practices than uneducated ones which contribute to improved child health and anemia status.

Rising children birth order significantly associated with child hood anemia in line with study [33–36].This might be due to distribution of scarce resources within the family and interrelated to maternal exhaustion of micronutrients. Mild maternal iron deficiency and anemia have few significant repercussions on the iron status of the newborn but severe anemia does have a strong influence.

Congested birth interval of children had negatively associated with children anemia this study was in line with the study conducted in Africa countries and Ethiopia the effect of the preceding birth interval variable on the index child’s hemoglobin level was positive and with every increase of one month of the preceding birth interval there is a gain of 0.015 g/l hemoglobin level[37–39].This might be due to short birth interval between birth might cause sharing problems among living siblings and parents can’t take better care of their children and compromise the breastfeeding duration of the former child [40].The mother herself may be biologically exhausted from too frequent births, and this could also negatively affect the nutritional status and hemoglobin level of the newborn baby as a result of the intergenerational link [41].

Children born from mothers with only one ANC visit were 1.5 times more likely to have anemia than children from mothers with the recommended number of ANC visit (four times and above).Study conducted in Gonder city (Ethiopia) found that home delivery was significantly associated with childhood anemia[16].Since maternal anemia is associated with childhood anemia [15] and study conducted in Addis Abeba, Ethiopia indicated no antenatal care visit was significantly associated with maternal

anemia [42]. This could be due to the benefit of the recommended number of ANC visit for early diagnosis and treatment of maternal anemia; maternal folate and iron supplementation; provision of de-worming medication; malaria prevention, diagnosis, and management; and provision of nutrition counseling all of which could have significant impact on childhood anemia.Therefore, mothers should attend the recommended number of ANC visit during the entire period of pregnancy to minimize the risk of child hood anemia.

Limitation of the study

The limitation of this study was its cross-sectional design, which does not allow the identification of the precedence in time between exposure and outcome (chicken egg dilemma).

Conclusion

The overall prevalence of anemia in this study using a cut off level of hemoglobin < 11 g/dl was 56.6% which never been reported from all previous EDHS reports. Since the prevalence of anemia in this study is the highest from all EDHS reports, strong intervention approach focusing on the identified variables should be in place. Child age, maternal age, wealth index of the household, whether mothers live with husband or not, respondent currently working, birth order of the child, birth interval of the child, number of ANC visit, stunting, and underweight were statistically significant predictors of childhood anemia. Childhood anemia should be the top priority agenda of the health sector at all health hierarchies, giving more responsibility to the primary health care unit.

Abbreviations

AOR-Adjusted odd ratio

ANC-Antenatal care

DHS-Demographic health survey

EDHS-Ethiopian demographic health survey

g/l-Gram per liter

WHO-World health organization

Declarations

Ethics approval and consent to participate

The study proposal got ethical approval from Tigray health research institute and formal letter of permission was obtained from measure DHS project website to access the dataset

(http://www.measuredhs.com)

Consent for publication

Not applicable

Availability of data and material

Availability of data and materials data and material availability declaration: the database and study materials are available under request directly to the authors.

Competing interests

The authors declare that they have no competing interests relevant to this manuscript

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AW contributed to the concept, data collection tool, conducted data extraction, analysis and interpretation of data, and wrote the first draft of the manuscript and revised it. GG,AD, AB,KA,TW and NB contributed to data curation, protocol development, data analysis and revised manuscript draft. All authors read and approved the final manuscript.

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Tables

Table 1: Socio demographic and other characteristics of pregnant mothers, EDHS 2106(n =3082)

Variables	Frequency	Percentage (%)
Maternal age(Years)		
<20years	31	1
20-29	1202	39
30-39	1584	51.4
40-49	265	8.6
Residence		
Rural	2723	88.4
Urban	359	11.6
Mother’s educational level		
Illiterate	2313	75
Primarily	616	20
Secondary	106	3.4
Higher	47	1.6
Currently working		
Yes	723	23.5
No	2359	76.5
Wealth index combined		
Poorest	1347	43.7
Poorer	534	17.3
Middle	423	13.7
Richer	423	13.7
Richest	355	11.5

Table 2: House hold characteristics of pregnant mothers, EDHS 2106 (n =3082).

Variables	Frequency	Percentage
Sources of drinking water		
Improved	1714	55.7
Non improved	1336	43.3
Others	32	1
Type of toilet facility		
Improved	1682	54.6
Non improved	1400	45.4
Has electricity		
Yes	464	15.
No	2588	84
Not adejure residence	30	1
Has radio		
Yes	730	23.7
No	2322	75.3
Not adejure residence	30	1
Has television		
Yes	203	6.6
No	2849	92.4
Not adejure residence	30	1
Number of house hold members		
1-3	287	9.9
4-6	1405	48.3
7-9	1142	39.9
>=10	72	2.5

Table 3: Obstetric characteristics of pregnant mothers, EDHS 2106 (n =3082)

Variables	Frequency	Percentage
ANC visit		
No ANC visit	344	46.6
1-3	213	28.7
≥4	185	24.9
Give iron during pregnancy		
Yes	277	37.3
No	462	62.3
Days of Iron given		
1-30	170	62.5
31-60	45	16.5
>60	57	21
Ever had terminated pregnancy		
Yes	355	11.5
No	2727	88.5
Drug for intestinal parasite		
Yes	45	6.1
No	693	93.4
Post natal check up		
Yes	59	8
No	683	92

Table: 4 Parameter estimates of related covariates in the final proportional odds model of pregnant mothers, EDHS 2106 (n =3082)

Variables		Anemia		COR (95% CI)	p-value	AOR (95% CI)	p-value
		Yes n (%)	No n (%)				
e	<20years	12 (38.7)	19 (61.3)	2.068 (0.951,4.496)	0.067	0.847 (0.343,2.094)	0.719
	20-29	495 (41.2)	707 (58.8)	2.292 (1.687,3.115)	<0.001*	1.133 (0.790,1.623)	0.498
	30-39	708 (44.7)	876 (55.3)	2.646 (1.958,3.576)	<0.001*	1.725 (1.241,2.397)	0.001*
	40-49	62 (23.4)	203 (76.6)	1		1	
	Urban	144 (40.1)	215 (59.9)	1			
	Rural	1133 (41.6)	1590 (58.4)	1.064 (0.850,1.332)	0.588		
ucational status	No education	1022 (44.2%)	1291 (55.8)	2.309 (1.1924.471)	0.013*	2.19(1.45,2.49)	0.01*
	Primary	201 (32.6)	415 (67.4)	1.413 (0.718,2.780)	0.317	0.845 (0.393,1.817)	0.666
	Secondary	42 (39.6)	64 (60.4)	1.914 (0.893,4.103)	0.095*	1.314 (0.576,2.999)	0.516
	Higher	12 (25.5)	35 (74.5)	1		1	
	Orthodox	175 (25.7)	505 (74.3)	1		1	
	Protestant	141 (29.4)	338 (70.6)	1.204 (0.927,1.563)	0.164	0.997 (0.751,1.323)	0.982
	Muslim	940 (51.2)	896 (48.8)	3.027 (2.492,3.678)	<0.001*	2.117 (1.693,2.649)	<0.001*
	Others	21 (24.1)	66 (75.9)	0.918 (0.546,1.545)	0.748	0.722 (0.421,1.238)	0.237
IH members	1-3	105 (36.6)	182 (63.4)	1		1	
	4-6	641 (45.6)	764 (54.4)	1.454 (1.119,1.890)	0.005*	1.443 (1.055,1.973)	0.022*
	7-9	446 (39.1)	696 (60.9)	1.111 (0.850,1.452)	0.442	0.937 (0.659,1.332)	0.716
	>=10	85 (34.3)	163 (65.7)	0.904 (0.633,1.290)	0.578	0.716 (0.457,1.122)	0.145
nder five	0	128 (35.0)	238 (65.0)	1		1	
	1	385 (34.9)	717 (65.1)	0.998 (0.779,1.279)	0.990	0.953 (0.721,1.260)	0.738
	2	611 (48.5)	648 (51.5)	1.753 (1.377,2.232)	<0.001*	1.471 (1.100,1.966)	0.009*
	>=3	153 (43.1)	202 (56.9)	1.408 (1.043,1.902)	0.026*	0.988 (0.690,1.415)	0.949
ead	Male	988 (38.1)	1604 (61.9)	1		1	
	Female	298 (59.0)	201 (41.0)	2.334 (1.917,2.842)	<0.001*	2.025 (1.614,2.540)	<0.001*
count	Yes	40 (19.6)	164 (80.4)	1		1	
	No	1237 (43.0)	1641 (57.0)	3.091 (2.170,4.401)	<0.001*	2.049 (1.376,3.051)	>0.001*
t	Poorest	684 (50.8)	663 (49.2)	2.153 (1.682,2.755)	<0.001*	1.29 (1.223, 1.643)	>0.001*
	Poorer	206 (38.6)	328 (61.4)	1.311 (0.988,1.738)	0.060*	0.926 (0.671,1.279)	0.641

	Middle	123 (29.1)	300 (70.9)	0.856 (0.630,1.162)	0.318	0.666 (0.475,1.735)	0.719*
	Richer	149 (35.2)	274 (64.8)	1.135 (0.842,1.530)	0.406	0.970 (0.697,1.351)	0.859
	Richest	115 (32.4)	240 (67.6)	1		1	
gnancy wanted	Then	1027 (44.2)	1295 (55.8)	2.370 (1.829,3.070)	<0.001*	1.934 (1.439,2.600)	<0.001*
	Later	165 (39.2)	256 (60.8)	1.926 (1.407,2.637)	<0.001*	1.756 (1.236,2.495)	0.002*
	Not at all	85 (25.1)	254 (74.9)	1		1	
rminated	Yes	113 (31.8)	242 (68.2)	1		1	
	No	1164 (42.7)	1563 (57.3)	1.595 (1.260,2.019)	<0.001*	1.489 (1.147,1.935)	0.003*
sex	<13yrs	35 (23.3)	115 (76.7)	1		1	
	13-17years	880 (42.8)	1175 (57.2)	2.461 (1.669,3.628)	<0.001*	1.966 (1.286,3.004)	0.002*
	>=18years	362 (41.3)	515 (58.7)	2.310 (1.546,3.451)	<0.001*	1.596 (1.023,2.489)	0.039*
esire for	Both want same	396 (40.8)	574 (59.2)	1		1	
	Husband wants more	536 (49.4)	550 (50.6)	1.413 (1.186,1.682)	<0.001*	1.093 (0.901,1.326)	0.368
	Husband wants fewer	67 (34.5)	127 (65.5)	0.765 (0.554,1.056)	0.103*	0.924 (0.652,1.309)	0.656
	Don’t know	272 (34.1)	526 (65.1)	0.750 (0.617,0.910)	0.004*	0.629 (0.507,0.780)	<0.001*
currently	Yes	302 (41.8)	421 (58.2)	1			
	No	975 (41.3)	1384 (58.7)	0.982 (0.829,1.163)	0.834		

Figures

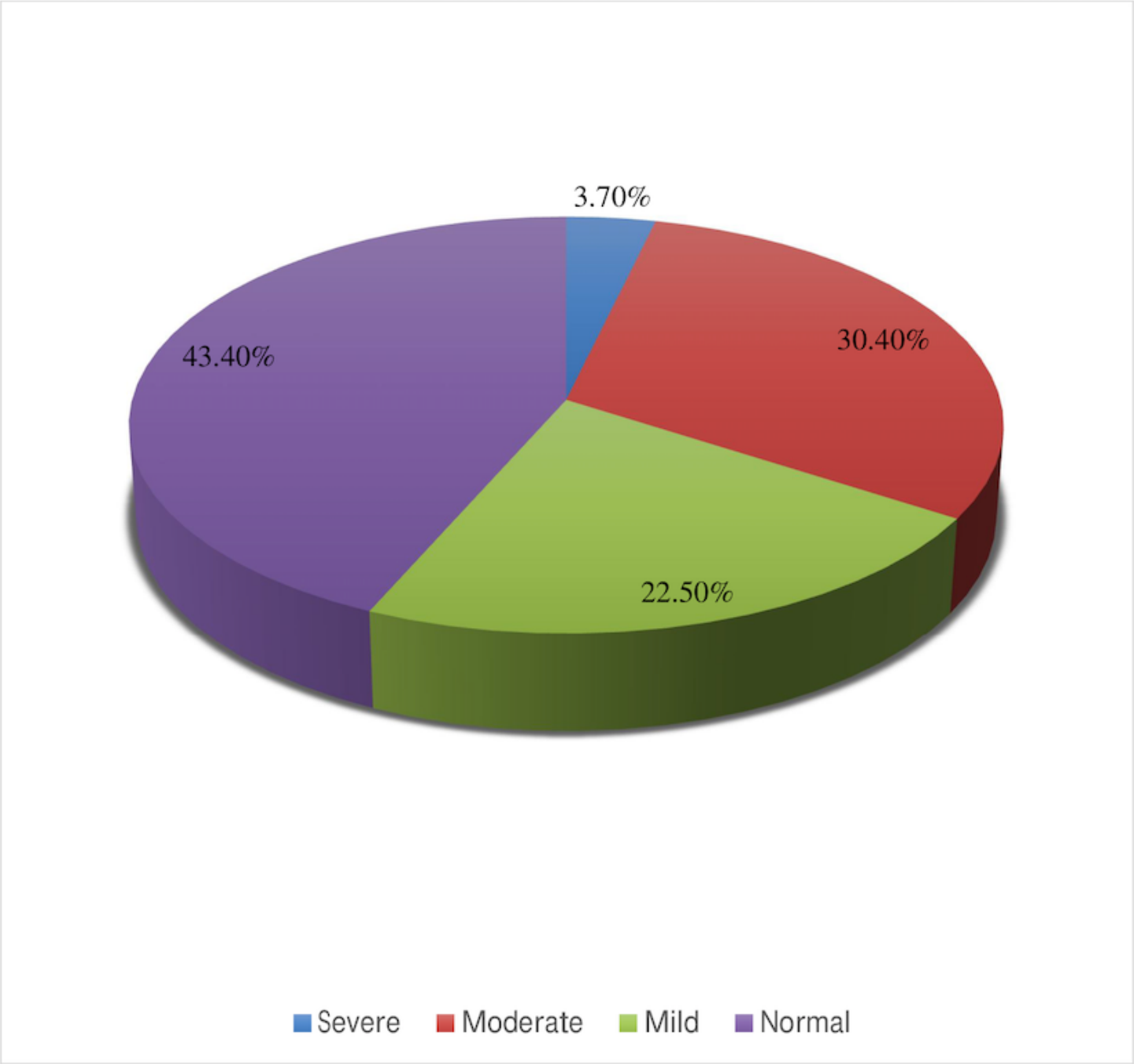

Figure 1

Severity of anemia among children 6-59 months of age, EDHS 2016 (n = 7689).

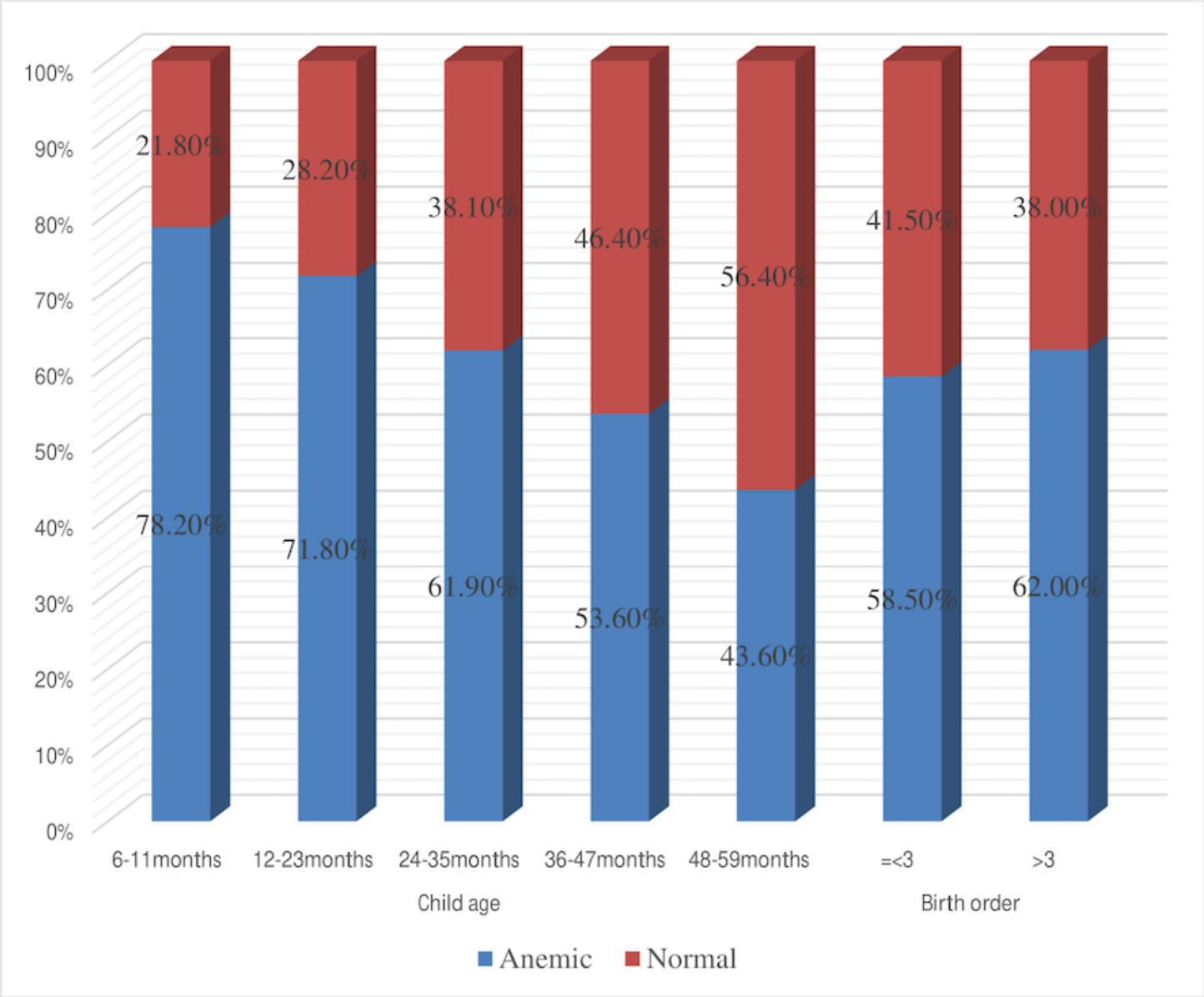

Figure 2

Anemia status with child age and birth order among children 6-59 months, EDHS 2016(n = 7689).

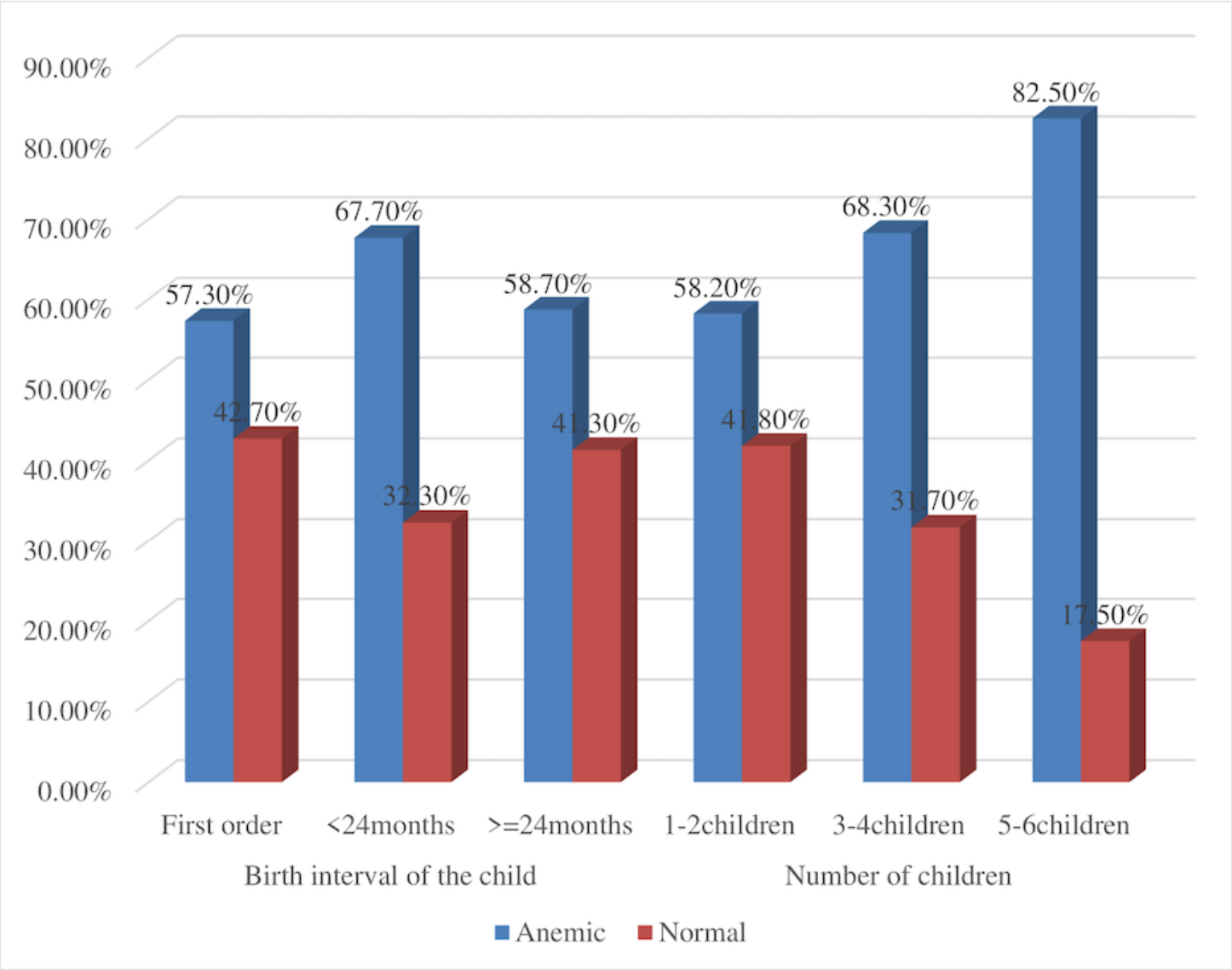

Figure 3

Maternal factors affecting anemia among children 6-59 months, EDHS 2016 (n = 7689).

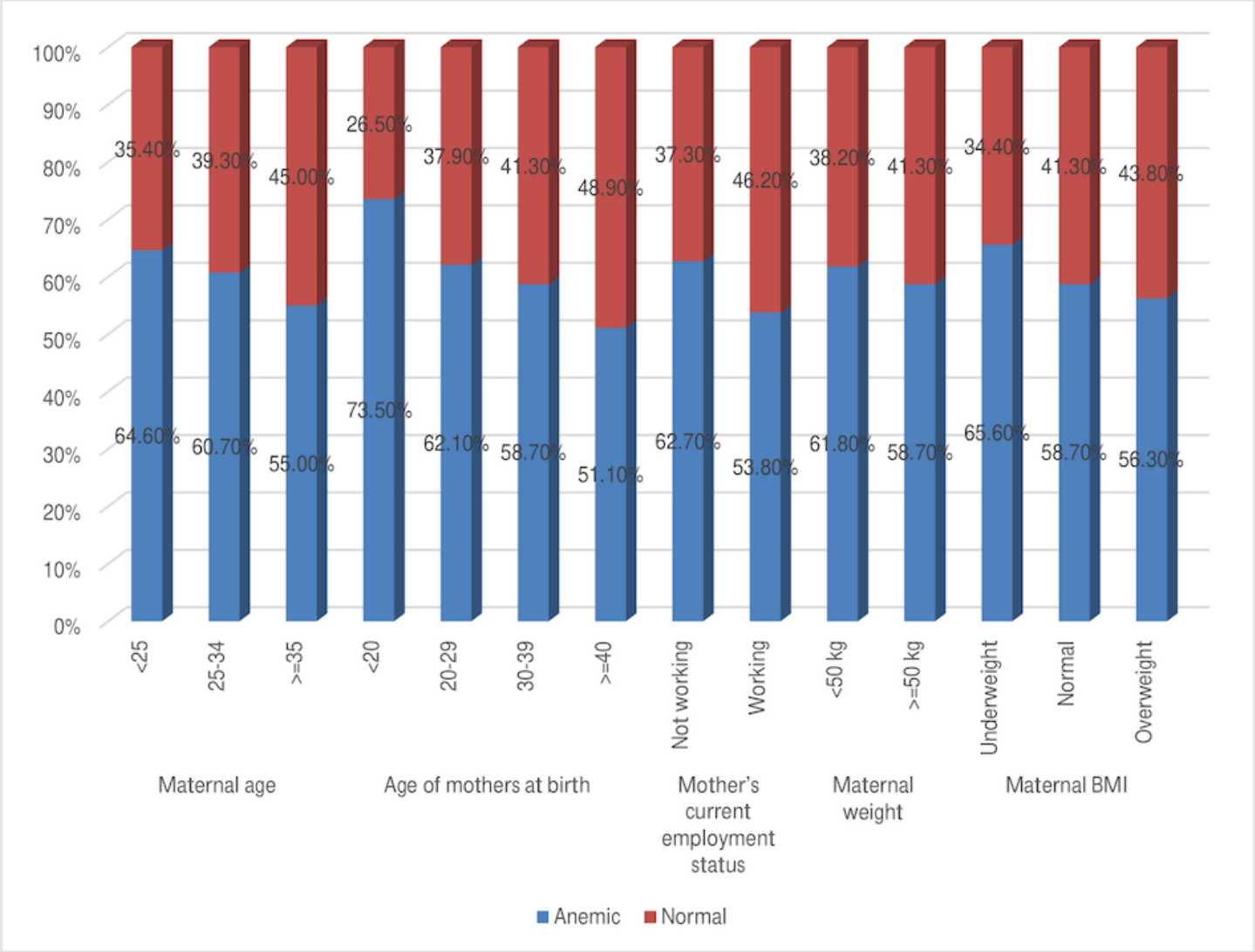

Figure 4

Relationship between anemia among 6-59 month of age children with Birth interval and number of children in the house hold, EDHS 2016(n = 7689).