Original Research Article

Prevalence and Determinants of Anaemia among Reproductive-aged Women in Ethiopia: A Nationally Representative Cross-sectional Study

Abstract

Anaemia in reproductive-aged women is a worldwide health problem. This study was aimed to assess prevalence and determinants of anaemia among reproductive-aged women in Ethiopia. Data for the study were obtained from 2016 Ethiopian demographic and health survey data, which is a national representative cross-sectional data. A Multivariable logistic regression model was applied to identify determinants of anaemia among reproductive-aged women. A total of 14460 women who aged 15 to 49 years were included in the study. Prevalence of anaemia of among reproductive-aged women was 27.08% (95% CI: 22.88, 31.08%). Women living in Afar (AOR=2.439; 95% CI: 2.006, 2.968), Amhara (AOR=1.269; 95% CI: 1.035, 1.556), Somalia (AOR=2.592; 95% CI: 2.142, 3.133), Benshangul-Gumuz (AOR=2.019; 95% CI: 1.666, 2.447), Gambela (AOR=2.465; 95% CI: 2.026, 2.998) were associated with high risk of anaemia. Women with 1 or 2 children (AOR=1.272; 95% CI: 1.103, 1.466), 3 or 4 children (AOR=1.277; 95% CI: 1.059, 1.539) and 5 or more (AOR=1.420; 95% CI: 1.213, 1.662) were associated with high risk of anaemia. Further, pregnant women (AOR=1.408; 95% CI: 1.263, 1.570) were associated with high risk of anaemia. Hence, the respective bodies need to pay special attention to women regarding anaemia based on place of residence and the region. The respective bodies should also provide women family planning programs.

Keywords: Anaemia, Reproductive-aged women, Ethiopia

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1. Introduction

Anaemia is defined as a condition in which concentration of red blood cells/hemoglobin is lower than the normal resulting in reduced oxygen-carrying capacity to meet physiologic needs of the body [1]. A non-pregnant and pregnant women are considered as anaemic if hemoglobin levels are lower than 120 gram/liter and lower than 110 gram/liter respectively [2]. Anaemia is one of the global widespread public health and nutritional problems affecting both developing and developed countries and occurs at all stages of life cycle prominently in young, pregnant women and other women in child bearing age [3]. It has significant adverse health consequences such as child mortality, maternal mortality, increased risk of adverse pregnancy outcomes, impaired neuro-cognitive and physical development of children and reduced work capacity, and adverse impacts on socio-economic development [4, 5]. Some of the symptoms that are resulted from impaired tissue oxygen delivery include weakness, fatigue, and difficulty in concentration [6].

Globally, it is thought that most commonly anaemia is caused by deficiency of iron. In addition, deficiencies in nutrition like folate, vitamin B12 and vitamin A, parasitic infections, acute and chronic inflammation and inherited or acquired disorder which affects synthesis of hemoglobin, production of red blood cell or survival of red blood cell can also cause anaemia [2].

The prevalence of anaemia in developed countries is estimated to be 9% and in that of developing countries 43% [7]. It is estimated that 42% of the pregnant women and 30% in non-pregnant women who are 15-49 years old are anaemic globally. It is also estimated that anaemia contributes to more than 115000 maternal deaths and also 591000 prenatal deaths globally annually [8]. Anaemia in reproductive-aged women is a worldwide health problem. The prevalence of anaemia is highest in Low Income countries predominantly in Africa. In Africa 57.1% of the pregnant and 47.5% of non-pregnant women are anaemic [3].

Despite Ethiopian ministry of health and its stakeholders are doing their best to decrease prevalence of anaemia in the country, the recent demographic and health survey report, 2016 EDHS showed an increase in the prevalence of anaemia among women aged 15-49 years as compared to 2011 EDHS report. The prevalence of anaemia among women who aged 15-49 years declined from 27% in 2005 to 17% in 2011[9] but then increased to 24% in 2016 in Ethiopia. Moreover, the prevalence of

anaemia is more among women than that of men in Ethiopia. According to 2016 EDHS report the prevalence of anaemia among women was 24% compared to 15% for men in 2016 in Ethiopia [10].

Some of the documented factors associated with anaemia among women include place of residence, geographic region, maternal age, maternal education level, marital status, wealth index, meal frequency per day, smoking cigarette, body mass index, nutrition education, contraceptive methods, intestinal parasitic infection, gravidity, pregnancy status, hookworm infection, chronic illness, parity, iron supplementation, and currently breast feeding, birth interval [11-29].

Anaemia in pregnant women causes increased risk of premature delivery and low birth weight [9]. So, it is essential to identify factors associated with anaemia among women in reproductive age to inform the planners of strategies to deal with the identified factors to reduce the chances of adverse maternal and fetal outcomes associated with anaemia, and to make the women healthy and give healthy births so that the they can freely participate and contribute their contributions in socio-economic activities for the development of the country. This study, therefore, aimed at assess the prevalence and determinants of anaemia among reproductive-aged women in Ethiopia.

2. Methods

2.1 Source of data

This study was based on a nationally representative cross-sectional survey, 2016 EDHS (2016 Ethiopian demographic and health survey) which was implemented by the Central Statistical Agency (CSA) from January 18 to June 27, 2016 in Ethiopia.

2.2 Study Area

This study was conducted in Ethiopia. Ethiopia is one of the countries in Africa continent and located in the Horn of Africa. It is bordered by six African countries: to the north and northeast by Eritrea, to the east by Djibouti and Somalia, to the west by Sudan and by South Sudan, and to the south by Kenya. And, it is the second most populous nation in African continent.

2.3 Sample Size

In this study, we used a sample of 14460 women aged 15 to 49 years.

2.4 Variables of the study

2.4.1 Dependent Variable

Dependent variable was anaemic status of women at a time survey.

2.4.2 Independent Variables

Independent variables included in this study were region, place of residence, marital status, level of education, wealth index, smoking cigarette, age, body mass index, parity, pregnancy status, and contraceptive methods.

2.5 Data Analysis

Data analysis was done using SPSS version 25. Multivariable logistic regression model was employed to identify the determinants of anaemia among women. The model goodness of fit was checked using Hosmer and Lemeshow test. The Hosmer and Lemeshow test result showed p-value = 0.120, which implies good fit for the model.

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3. Results

3.1 Descriptive Statistics Results

3.1.1 Prevalence of anaemia among women

A total of 14460 women of which 3916 (27.08%) anaemic were included in this study (Table 1).

Table 1. Prevalence of anaemia among women in Ethiopia

		Counts	Percent
Anaemic	**Yes**	3916	27.08
	No	10544	72.92
Total		14460	100

3.1.2 Background characteristics of women

Of total of 14460 women included, about two-third (67.52%) of the women were living in rural while remaining 32.48% of them were living in urban at a time of the survey. Regarding geographic region, 10.89% of them were living in Tigray region while remaining 7.05%, 11.65%, 12.46%, 8.70%, 7.07%, 12.15%, 6.80%, 5.17%, 11.13% and 6.58% of them were living respectively in Affar region, Amhara region, Oromia region, Somalia region, Somalia region, Benshangul-Gumuz region, SNNPR, Gambela region, Harari region, Addis Ababa, and Dire Dawa at time of survey (Table 2).

Regarding age, more than one-fifth (21.89%) of the women were in the age group of 15-19 years, about one-sixth (18.16%) of the them were in the age group of 20-24 years, about one-sixth (18.06%) of them were in the age group of 25-29 years, about one-seventh (14.29%) of them were in the age group of 30-34 years, about one-eighth (13.07%) of them were in the age group of 35-39 years, 8.25% of them were in the age group of 40-44 years and remaining 6.28% of them were in age group of 45-49 years at a time of the survey. Regarding marital status, majority (63.64%) of them were married or living together, about one-fourth (26.29%) of them were single, 2.88% of them were widowed while the remaining 7.19% of them were divorced/no longer living together/separated at a time of the survey. Regarding parity, majority (33.29%) of the women had no child, about one-fourth(25.66) of them had 5 or more children, 23.62% of the them had 1 or 2 children while the remaining 17.43% of them had 3 or 4 children at a time of the survey (Table 2).

About 45.50% of the women did not attain formal education, about one-third (33.58%) of them attained primary education, 13.82% of them attained secondary education while the remaining only 7.10% of them attained higher than secondary education at a time of the survey. Regarding wealth index, majority (34.72%) of women were richest, one-fourth (25.17%) of them were poorest, 13.51% of them were poorer, 13.15% of them were Medium while 13.46% of them were richer at a time of the survey. Only 123 (0.85%) of the women were smoking cigarette while the remaining majority (99.15%) of them were not smoking at a time of the survey (Table 2).

Majority (65.15%) of the women had body mass index between 18.5 and 24.9, 23.45% of them had body mass index less than 18.5 and the remaining only 11.40% of them had body mass index of 25 and above. Regarding pregnancy statuses, about nine-tenth (92.73%) of the women were not pregnant while the remaining only 7.27% of them were pregnant at a time of the survey. Regarding contraceptive methods, more than three-fourth (78.35%) of the them were not using contraceptive methods while the remaining 21.65% of the women were using it at a time of the survey (Table 2).

3.1.3 Bivariate analysis result

The prevalence of anaemia among women was highest in Somalia region (58.35%) followed by Affar region (45.65%) and it was lowest in Addis Ababa city administrative (15.79%) followed by Benishangul-Gumuz region (19.48%) (Table 2).

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Regarding place of residence, prevalence of anaemia among women in rural area (30.61%) was higher than in urban (19.76%). The prevalence of anaemia among women was highest for those who aged 30-34 years (29.93%) followed by age group 35-39 years (28.83%) and it was lowest in those women who aged 15-19 years (23.73%) followed by age group 45-49 years (24.35%) (Table2).

The prevalence of anaemia among women decreased with increased level of education. It was highest among those women who were not educated (33.94%) and it was lowest among those women whose level of education was higher than the secondary education (15.19%). Likewise, it decreased with increased body mass index. It was highest among those women whose body mass

index was less than 18.5 (32.11%) and lowest for those women whose body mass index was 25.0 and above (21.35%) (Table 2).

The prevalence of anaemia among women was highest for those women whose total number of children ever born were 5 or more (34.36%) followed by those women whose total number of children ever born were 3 or 4 (29.29%) and lowest for those women who had no child (12.75%). Similarly, it was higher for those women who were pregnant (37.58%) than those who were not pregnant (26.26%) (Table 2).

The prevalence of anaemia among women was also higher for women who were not using contraceptive methods (29.36%) than those who were using contraceptive methods (18.79%). Similarly, it was higher for those women who were smoking cigarette (29.27%) than those who were not smoking (27.06%) (Table 2).

All independent variables except smoking cigarette were significant in bivariate analysis. Those significant independent variables (with p-value < 0.25) in bivariate analysis were included in the multivariable logistic regression analysis.

Table 2. Bivariate analysis of anaemia by background characteristics of women in Ethiopia (n=14460)

Variables	Categories	Frequency	Anaemic		P-value
		n(%)	Yes, n(%)	No, n(%)	
Region	Tigray	1597 (10.89)	330 (20.66%)	1267 (79.34%)	0.000
	Affar	1034 (7.05)	472 (45.65%)	562 (54.35%)	
	Amhara	1684 (11.65)	296 (17.58%)	1388 (82.42%)	
	Oromia	1801 (12.46)	482 (26.76%)	1319 (73.24%)	
	Somalia	1258 (8.70)	734 (58.35%)	524 (41.65%)	
	Benishangul-Gumuz	1037 (7.07)	202 (19.48%)	835 (80.52%)	
	SNNPR	1757 (12.15)	378 (21.51%)	1379 (78.49%)	
	Gambela	983 (6.80)	276 (28.08%)	707 (71.92%)	
	Harari	748 (5.17)	204 (27.27%)	544 (72.73%)	
	Addis Ababa	1609 (11.13)	254 (15.79%)	1355(84.21%)	
	Dire Dawa	952 (6.58)	288 (30.25%)	664 (69.75%)	
Place of residence	Rural	9763 (67.52)	2988 (30.61%)	6775(69.39%)	0.000
	Urban	4697 (32.48)	928 (19.76%)	3769(80.24)	
Level of education	No education	6580 (45.50)	2233 (33.94%)	4347(66.06)	0.000
	Primary	4855 (33.78)	1139 (23.46%)	3716(76.54)	
	Secondary	1998 (13.82)	388 (19.42%)	1610(80.58)	
	Higher	1027 (7.10)	156 (15.19%)	871(84.81)	
Age	15-19	3165 (21.89%)	751 (23.73%)	2414(76.27)	0.000
	20-24	2662 (18.16)	713 (26.78%)	1949(73.22)	
	25-29	2647 (18.06)	760 (28.71%)	1887(71.29)	
	30-34	2088 (14.29)	625 (29.93%)	1463(70.07)	
	35-39	1769 (13.07)	510 (28.83%)	1259(71.17)	
	40-44	1209 (8.25)	333 (27.54%)	879(72.46)	
	45-49	920 (6.28)	224 (24.35%)	696(75.65)	
Marital status	Single	3801 (26.29)	763 (20.07%)	3038(79.93%)	0.000
	Married/living together	9203 (63.64)	2800 (30.42%)	6403(69.58%)	
	Widowed	416 (2.88)	110 (26.44%)	306(26.44%)	

	Divorced/no longer living together/separated	1040 (7.19)	243 (23.37%)	797(76.63%)	
Wealth index	Poorest	3639 (25.17)	1511 (41.52%)	2128(58.48%)	0.000
	Poorer	1953 (13.51)	546 (28.00%)	1407(72.00%)	
	Middle	1901 (13.15)	483 (25.41%)	1418(74.59%)	
	Richer	1946 (13.46)	421 (21.63%)	1525(78.37%)	
	Richest	5021 (34.72)	955 (19.00%)	4066(81.00%)	
Smoking Cigarette	No	14337 (99.15)	3880 (27.06%)	10457(72.94%)	0.584
	Yes	123 (0.85)	36 (29.27%)	87(70.73%)	
Body mass index	Less than 18.5	3391 (23.45)	1089 (32.11%)	2302(67.89%)	0.000
	18.5-24.9	9420 (65.15)	2475 (26.27%)	6945(73.73%)	
	25.0 and above	1649 (11.40)	352 (21.35%)	1297(78.65%)	
Parity	No child	4814 (33.29)	996 (12.75%)	3818(87.25%)	0.000
	1 or 2	3415 (23.62)	907 (26.56%)	2508(73.44%)	
	3 or 4	2520 (17.43)	738 (29.29%)	1782(70.71%)	
	5 or more	3711 (25.66)	1275 (34.36%)	2436(65.64%)	
Pregnancy status	No	13409 (92.73)	3521 (26.26%)	9888(73.74%)	0.000
	Yes	1051 (7.27)	395 (37.58%)	656(62.42%)	
Contraceptive methods	No	11330 (78.35)	3328 (29.36)	8002 (70.64%)	0.000
	Yes	3130 (21.65)	586 (18.72)	2544(81.28%)	

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3.2 Inferential Statistics Results

The multivariable logistic regression analysis result revealed that region, place of residence, age, wealth index, body mass index, parity, and pregnancy status were significantly associated with anaemia among women (Table 3).

The odds of being anaemic for women who live in Afar region was 2.439 times (95% CI for AOR: 2.006, 2.968) higher than for those who live in Tigray region. Similarly, the odds of being anaemic for women who live in Amhara region, Somalia region, Benshangul-Gumuz region and Gambela region were 1.269 times (95% CI for AOR: 1.035, 1.556), 2.592 times (95% CI for AOR: 2.142, 3.133), 2.019 times (95% CI for AOR: 1.666, 2.447) and 2.465 times (95% CI for AOR: 2.026, 2.998) respectively higher than for those who live in Tigray region. On the other hand, the odds of being anaemic for women who live in Oromia region, SNNPR region, Harari region, Addis Ababa and Dire Dawa were 0.374 times (95% CI for AOR: 0.305, 0.458), 0.372 times (95% CI for AOR: 0.299, 0.465), 0.641 times (95% CI for AOR: 0.521, 0.789), 0.794 times (95% CI for AOR:0.638, 0.989) and 0.613 times (95% CI for AOR:0.501, 0.749) respectively less than for those who live in Tigray region (Table 3).

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It was also revealed that the odds of being anaemic for women who live in urban was 0.496 times (95% CI for AOR: 0.420, 0.586) less than for those who live in rural areas. The odds of being anaemic for women aged 20-24 years was 1.687 times (95% CI for AOR: 1.341, 2.123) higher than for those who aged 15-19 years. Similarly, the odds of being anaemic for women aged 25-29 years, 30-34 years, 35-39 years and 40-44 years, 45-49 years were 1.707 times (95% CI for AOR: 1.381, 2.109), 1.601 times (95% CI for AOR: 1.317, 1.946), 1.544 times (95% CI for AOR: 1.277, 1.867), 1.391 times (95% CI for AOR: 1.148, 1.686), 1.231 times (95% CI for AOR: 1.001, 1.513) respectively higher than for those who aged 15-19 years (Table 3).

Furthermore, the odds of being anaemic for the richer women was 0.277 times (95% CI for AOR: 0.172, 0.447) less than for the poorest women. The odds of being anaemic for the richest women was 0.158 times (95% CI for AOR: 0.073, 0.343) less than for the poorest women. Likewise, the odds of being anaemic for the women whose body mass index is between 18.5 and 24.5 was 0.272 times

(95% CI for AOR: 0.144, 0.512) less than for those whose body mass index is less than 18.5. Similarly, the odds of being anaemic for the women whose body mass index is 25.0 and above was 0.420 times (95% CI for AOR: 0.294, 0.600) less than for those whose body mass index was lower than 18.5 (Table 3).

Also, pregnancy status was found to be predictor factor of anaemia among women. The odds of being anaemic for the pregnant women is 1.408 times (95% CI for AOR: 1.263, 1.570) higher than for non-pregnant women. The odds of being anaemic for women who ever bore 1 or 2 children was 1.272 times (95% CI for AOR: 1.103, 1.466) higher than for those who had no child. The odds of being anaemic for women who ever bore 3 or 4 children was 1.277 times (95% CI for AOR: 1.059, 1.539) higher than for those who had no child. Similarly, the odds of being anaemic for women who ever bore 5 or more children was 1.420 times (95% CI for AOR: 1.213, 1.662) higher than for those who had no child (Table 3).

Table 3. Multivariable logistic regressions analysis of factors associated with Anaemia among women in Ethiopia

Variables	B	S.E.	Wald	Df	Sig.	AOR	95.0% CI for AOR)	
							Lower	Upper
Region (Tigray:Rf)			617.024	10	0.000*			
Affar	0.892	0.100	79.649	1	0.000*	2.439	2.006	2.968
Amhara	0.238	0.104	5.182	1	0.026*	1.269	1.035	1.556
Oromia	-0.984	0.104	89.637	1	0.000*	0.374	0.305	0.458
Somaila	0.952	0.097	96.410	1	0.000*	2.592	2.142	3.133
Benshangul-Gumuz	0.703	0.098	51.416	1	0.000*	2.019	1.666	2.447
SNNPR	-0.988	0.113	76.627	1	0.000*	0.372	0.299	0.465
Gambela	0.902	0.100	81.395	1	0.000*	2.465	2.026	2.998
Harari	-0.444	0.106	17.723	1	0.000*	0.641	0.521	0.789
Addis Ababa	-0.230	0.112	4.249	1	0.039*	0.794	0.638	0.989
Dire Dawa	-0.490	0.102	22.966	1	0.000*	0.613	0.501	0.749
place of residence (Rural: Rf)			7.858	1	0.004*			
Urban	-0.701	0.085	69.143	1	0.004*	0.496	0.420	0.586
Age (15-19: Rf)			31.685	6	0.000*			
20-24	0.523	0.117	19.947	1	0.000*	1.687	1.341	2.123
25-29	0.535	0.108	24.495	1	0.000*	1.707	1.381	2.109
30-34	0.471	0.099	22.368	1	0.000*	1.601	1.317	1.946
35-39	0.434	0.097	20.069	1	0.000*	1.544	1.277	1.867
40-44	0.330	0.098	11.324	1	0.001*	1.391	1.148	1.686
45-49	0.207	0.105	3.874	1	0.042*	1.231	1.001	1.513
Wealth index (Poorest: Rf)			68.013	4	0.000*			
Poorer	-1.097	0.584	3.528	1	0.061	0.334	0.106	1.049
Middle	-0.728	0.394	3.412	1	0.059	0.483	0.223	1.046
Richer	-1.284	0.244	27.680	1	0.002*	0.277	0.172	0.447
Richest	-1.845	0.396	21.711	1	0.000*	0.158	0.073	0.343
Body mass index (Less than 18.5: Rf)			39.201	2	0.000*			
18.5-24.5	-1.302	0.323	16.247	1	0.000*	0.272	0.144	0.512
25.0 and above	-0.868	0.182	22.719	1	0.001*	0.420	0.294	0.600
Parity (No child: Rf)			38.279	3	0.000*			
1 or 2	0.241	0.073	10.991	1	0.001*	1.272	1.103	1.466
3 or 4	0.244	0.095	6.539	1	0.011*	1.277	1.059	1.539
5 or more	0.351	0.080	18.967	1	0.000*	1.420	1.213	1.662

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Pregnancy status (No: Rf)			37.924	1	0.000*			
Yes	0.342	0.055	38.014	1	0.000*	1.408	1.263	1.570
Constant	-1.543	0.131	137.622	1	0.000*	0.214		

Rf = Reference category, β = Regression coefficient, Sig.=Significance, AOR= Adjusted odds ratio, *= significant at 5% level of significance, Df=Degree freedom, S.E.= Standard error of estimated parameter, CI= Confidence interval

4. Discussion

This study was aimed to assess prevalence and determinants of anaemia among women of reproductive in Ethiopia. A total of 14,460 women of which 3,916 (27.08%) were anaemic were included in this study.

In this study, the prevalence of anaemia among reproductive-aged women in Ethiopia was 27.08% (95% CI: 22.88, 31.08%) which is almost similar with earlier study conducted in Turkey [12]. Prevalence of anaemia in our study was higher than the studies conducted in Iran [13], Ethiopia [14, 15], Vietnam [16], while it was lower than the other studies conducted in Lao PDR [17], India [18], Nepal [19], Cambodia [20], and Bangladesh [21]. The reason for the variation in prevalence of anaemia in this study from those mentioned studies might be because of the differences in socioeconomic status, geographical location of the study area above sea level, and study period.

Furthermore, region, place of residence, age, wealth index, body mass index, parity and pregnancy status were significant determinants of anaemia among women.

Place of residence was found to be significant determinant of anaemia among women of reproductive age in Ethiopia. It was revealed that women who live in rural areas were more likely to be anaemic than those who live in urban areas. This result agrees with findings of the study done previously in Ethiopia [22], and Lao PDR [17]. The possible reason could be that those women who live in rural area may not have adequate health services and access for information on factors that influence anaemia due to lack of facilities and services like education. The study also showed that region had association with anaemia among women of Ethiopia. In support to our study, earlier studies in Uganda [23], Myanmar [24], Rwanda [25], Pakistan [26], and Lao PDR [17] also showed that geographic location had significant association with anaemia among women of reproductive age. Women from poorest families are more likely to be anaemic as compared to those from richest families. This result is consistent with the result of the previously conducted studies in in Uganda [23], Ethiopia [27], Meghalaya [28], Rwanda [25], and Sudan [29] which revealed that women from poorest families were more likely to be anaemic than those from the richest families. The reason might be that the poorest households cannot afford good diet, and may not have good sanitation.

In this study, it was also found that age was significantly associated with anaemia among women in Ethiopia. Previously conducted study in Uganda [23] showed that age had significant associated with anaemia among women of reproductive age. Our study revealed that women aged between 20 and 39 years are more likely to be anaemic than those who were in other age groups, which is almost similar to the results obtained from studies conducted in Uganda [23], and Ethiopia [30]. The possible explanation might be that woman could have more of her lifetime births by this age group.

In line with previously conducted studies in Ethiopia [31-33], India [34], and Pakistan [26] our study also revealed that women with higher body mass index were less likely to be anaemic than those with lower body index. Therefore, it is recommended to give particular attention to include micronutrients initiatives as a prioritized program for those who with lower body mass. Pregnant women were more likely to be anaemic than non-pregnant ones. This result agrees with the result obtained from the study done in Uganda [23], Mynmar [24], and Ethiopia [30], Tanzania [35] which revealed that pregnant women were at higher risk of anaemia compared to non-pregnant women. This could be explained by the fact that in pregnancy period nutritional demand of woman is highest in a woman's life and pregnant women are advised to eat more diversified diets than usual and they might not get diversified enough diets.

In this study, it was also found that women with higher number of ever born children were more likely to be anaemic than those with lower number of ever born children. This result is supported by the

results revealed from the earlier studies [36-38] which revealed that women with parity of two or more were at higher risk of anaemia compared with those with lower parity. This might be due to the fact that in pregnancy there is blood volume expansion that increases iron demand and for this more blood is produced to support the growth of the baby. When the woman's dietary needs are not met during the pregnancy, she would be at risk of anaemia, and the more a woman gets pregnant, the higher risk she will be anaemic.

5. Conclusions

The result of this study demonstrated that about one-fourth of women had anaemia. In the study, region, place of residence, age, wealth index, body mass index, parity, and pregnancy status were identified as significant determinants of anaemia among reproductive-aged women. Women living in Gambela, Somali, Affar, and Benshangul-Gumuz region were associated with higher risk of being anaemic. Similarly, women aged 20-39 years, women with lager number of ever born children, and pregnant women were associated with higher risk of being anaemic. On the other hand, women living in urban areas, women with higher economic status, and women with higher body mass index were associated with reduced risk of being anaemic. Hence, the respective bodies need to pay special attention to women regarding anaemia based on place of residence and the region. The respective bodies should also provide women family planning programs.

Comment [u12]: How do you recommend FP, since it was not significant in your study?
Please try to recommend based on your study finding to the specific concerning organ in order to either reduce or resolve the problem of mothers in the reproductive age group in Ethiopia.
Its highly recommended that every study must applied to the socialite benefit.

6. Limitations

Some important determinant factors were not incorporated in the analysis due to high missing values in the data used. Furthermore, because of cross-sectional nature of the data used for the study, it was not possible to determine the cause-effect relationship between anaemia and its predictors.

Abbreviations

CSA	Central Statistical Agency
DHS	Demographic and Health Survey
EDHS	Ethiopian Demographic and Health Survey
SNNPR	Southern Nations, Nationalities and People's Region
WHO	World Health Organization

Ethics Approval

Ethical approval was not necessary as this study used the 2016 EDHS publicly available secondary data which is available on the DHS website (http:// dhsprogram.com).

Consent to participate

Not applicable

Availability of Data

The data used for the final analysis in this study is available from corresponding author upon reasonable request.

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