

# Timing of the First Antenatal Care Visit and Associated Risk Factors in Rural Parts of Ethiopia

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## ABSTRACT

Early antenatal care visits promote early detection and treatment of complications during pregnancy. The aim of this study was to assess the timing of the first antenatal care visit and associated factors in rural parts of Ethiopia. Only 3,065 women from 2016 Ethiopian Demographic and Health Survey in rural area were included in this study. The descriptive and binary logistic regression analysis were used to identify the determinants associated with the timing of the first antenatal care visit. This study revealed that 31% of women visited the first antenatal care within the first three months. The study revealed that women's education, maternal age, region, media access, occupation, distance from health facility, wealth index, pregnancy complication, and plan for pregnancy had significant effects on the timing of the first antenatal care visit. To initiate pregnant mothers to attend the first ANC visit in a timely manner, community-based services like media coverage, education, transportation, and awareness about the necessity of having antenatal care service early is mandatory.

## KEYWORDS

Antenatal Care, Early Visit, Risk Factors

## BACKGROUND

Pregnancy-related deaths and diseases remain unacceptably high worldwide, around 303,000 women and adolescent girls and 2.7 million babies during the first 28 days of life, died due to pregnancy and childbirth related complications and 2.6 million babies were stillborn in 2015 (Alkema L, 2016). An increased access to and use of higher-quality health care during pregnancy and childbirth can prevent many deaths and diseases, as well as improve women and adolescent girls' experience of pregnancy and childbirth (WHO, 2020). According to WHO reports in 2017, 295, 000 women worldwide lost their lives during and following pregnancy and childbirth, about 86% of those deaths occurred in sub-Saharan Africa and South Asia (World health statistics, 2020).

Nearly 99% maternal mortality and 98% child mortality occurred in low and middle-income countries. If the pregnant women or adolescent girls had been able to visit antenatal care (ANC) properly, the maternal death could be preventable (WHO, 2016). In 2016, WHO developed new model for the antenatal care visits, which recommends pregnant women to have their first contact during the first 12 weeks' gestation, and then follow the time schedule as 20, 26, 30, 34,36, 38 and

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40 weeks' gestation. ANC visit brings positive pregnancy outcomes when the booking starts within the recommended pregnancy period and if the frequencies of contacts are adequate (WHO, 2016). Giving attention for maternal and fetal assessments to detect complications, improving support and communication between healthcare providers and pregnant women, increases the likelihood of positive pregnancy outcomes (Tuncalp Ö 2017).

Several studies indicated that women, not empowered in household decision-making or exposed to any form of mass media, have lower ANC utilization (Assefa E, 2017), (Acharya D, 2015), (Collins Z, 2015). Women from rural communities have had fewer ANC visits with significant variations in the number of ANC visits compared to urban, Muslim women had fewer ANC visits than Christian women across all survey years (Ousman SK, 2019).

Mothers who visited antenatal care timely in their pregnancy period had enough time for essential and feasible interventions, prevention of complications and early identification of underlying conditions (FMOH, 2014). Study conducted in Debre Markos indicated that women from rural areas are more likely to delay on first ANC visit (Ewunetie et al., 2018). According to Ethiopian Demographic Health Survey report of 2016, about 37% of women were not visited ANC service during their pregnancy time. Most of women (41%) from rural were more likely to have had no ANC visits compared to women from urban (10%) and only 20% of women had their first ANC during the first trimester of pregnancy (CSA, 2016). As shown in the reports of Ethiopian Demographic health survey a few women were experienced the timely ANC visit and most women from rural area not visited timely. Therefore, this study intended to investigate the timing of the first antenatal care utilization and associated risk factors in rural parts of Ethiopia.

## **METHODS**

### **Study Design And Data Set**

In Ethiopia, there are nine regions and two administrative cities total. This study conducted in rural parts of nine regions and one city administration by excluding mothers from urban. The representative sample of all rural dweller women aged 15-49 were taken. The data used for this study were taken from the Ethiopian Demographic and Health Survey implemented by the Central Statistical Agency (CSA) at the request of the Federal Ministry of Health (FMOH) in 2016 and it is the fourth inclusive survey. The survey was a population-based cross-sectional study obtained between January 18, 2016 and June 27, 2016, through the country and data are available at [https://www.dhsprogram.com/data/dataset\\_admin/login\\_main.cfm](https://www.dhsprogram.com/data/dataset_admin/login_main.cfm) DHS database. From samples of 18,008 households selected for interview, 16,650 households interviewed for individual interview and 16,583 eligible women identified from the interviewed household. However, total 15,683 women aged 15-49 were participated and completed full information during interview (CSA, 2016). About 3,065 women aged 15-49 who were from rural residence considered to identify timely contact status of mothers with healthcare service providers in this study.

### **Study Variables**

The dependent variable in this study was the timing of ANC visit status. Timing of ANC visit defined as booking of ANC visit according to WHO recommendation time schedule. Mothers who visited the health facility during pregnancy less than or equal to 12 weeks of gestation considered as early visited and greater than 12 weeks considered as late (WHO, 2016). The explanatory variables considered in this study selected based on different articles published previously (Ayele D. G., 2016) (Gebresilassie et al., 2019) (Solomon G. et al., 2016). Socio-demographic variables (maternal age, region, husbands educational level, mother's educational level, mother occupation, husband occupation, marital status, wealth index and Media exposure), Fertility related variables (Pregnancy complication and Pregnancy

termination) and ANC visit related variables (Distance from healthcare facility, planned pregnancy and peer influence).

### **Statistical Data Analysis**

The data extracted from EDHS 2016 for this study were cleaned, coded and analyzed using the SPSS version 20 and R- version 3.6.2 statistical software. For statistical analysis, the descriptive analysis using frequency and percentage, and from inferential statistics multiple binary logistic regression applied to identify the risk factors of timely booking at pregnancy time of women. The predictor variables those are significant in the univariable analysis at 25% (p-value < 0.25) level of significance were included in the multivariable binary logistic regression analysis. The estimated odds ratios and 95% confidence intervals with p-value less than 5% indicates that the variables are statistically significant in multivariable analysis and used to interpret results.

## **RESULTS**

### **Socio-Demographic Characteristics Of Respondents**

Among 3065 participants in the study, nine hundred Forty six (31%) of women visited first ANC within twelve weeks, while majority of participants 69% visited after twelve weeks in this study. About 1880(61.34%) women were not attended formal education, and from those women five hundred forty (28.7%) booked first ANC visit early. Majority of participants 1606(52.4%) belongs to poorer wealth index, and of which 457(28.5%) women attended their first ANC checkup timely. Out of 827(26.98%) of the respondents from the richer wealth index, about 281(34%) followed their ANC service timely. Above one fourth of women (27.93%) were in the age group 25 and 29 years, and among those only 273(31.9%) followed the first ANC checkup within the recommended time interval. Only seventy (2.28%) participants included from age group 44 and 49 years (Table 1).

Among the participants in the study, 128(4.18%) women were from the Dire Dawa city administration and from those women 73(57.4%) were attended ANC visit within the first three months. Five hundred forty (17.62%) were from South Nation Nationality People Region, and of which 110(20.4%) booked their first ANC visit early. Approximately half of participants were single and from which only 444(28.9%) attended their first ANC contact early. Only seventy-seven (31.4%) women was belonged to husbands who had no any work and they were visited their first ANC early. About 667(21.76%) women husbands were private workers. Among women in the study, four hundred ninety-five (29.3%) women had no any work and visited ANC earlier, whereas two hundred fifteen (31.8%) were housewife's and visited ANC earlier. Only four hundred sixteen (29.6%) women who belongs to husbands of no education were attended their first visit within recommended time (Table 1).

### **Fertility Related Characteristics Of Respondents**

Out of a total participant, 1266(41.31%) women had pregnancy complication and from those 842(66.5%) women booked for first ANC after three months while 424(33.5%) respondents booked for first ANC checkup within the first three months. Among those pregnant women who had no pregnancy complication, 1277(71%) women attended their first ANC after 3 months whereas the rest 522(29%) women attended within three months. From 2766 (90.24%) pregnant women who had never faced pregnancy termination, only eight hundred sixty (31.1%) women booked their first ANC contact at recommended time (Table 1).

### **Antenatal Care Service-Related Characteristics**

Even though the majority of respondents' pregnancy was planned 2796(91.2%), but from women who planned to have pregnancy in this study only 872(31.2%) women were booked for their first antenatal care check early. Majority of respondents (87.01%) had no media access to get information about

antenatal care earlier. From those respondents only seven hundred eight one (29.3%) women booked for first ANC within twelve weeks. Among 1466(47.83%) pregnant mothers having big distance problem, 1004(68.5%) were not booked for their first ANC visit (Table 1).

### **Association Of Timing Of The First Antenatal Care Visit And Associated Risk Factors In Rural Parts Of Ethiopia Using Binary Logistic Regression Analysis**

Multivariable binary logistic regression used to identify the variables, which had significant effect on the first ANC visit in this study. The variables those were significant in the univariable analysis were included in the final multivariable analysis. As shown in the Table 2, the odds ratio for secondary and above educated women is AOR = 1.52 with p-value 0.02. This implies that women who attended secondary and above formal education were 1.52 times more likely to visit first ANC booking timely compared to women who were not attended education. Women in age group 30-34 year had odds ratio AOR =1.57 with p-value 0.02, which indicates that mothers in age group 30-34 is exceeds in age group 15-19 by 57% to visit ANC earlier. The odds ratio for women in age group 35-39 is AOR =1.56 with p-value =0.03, which implies that women in age group 35-39 is 1.56 times more likely to experience early ANC visit than women in age group 15-19 (Table 2).

The odds ratio for women from Amhara region is AOR =0.71 with p-value 0.02, Gambela region AOR =0.60 with p-value 0.01, Harari region AOR =0.36 with p-value 0.0001 and Dire Dawa city administration AOR =0.25 with p-value 0.0001. Which implies that women from Amahara, Gambela, Harari and Dire Dawa city administration were less likely to visit health facility for ANC earlier compared to women from Tigray region. The odds ratio for Benishangul Gumuz region AOR =1.53 with p-value0.01 and for SNNPR AOR =1.63 with p-value 0.0001, which revealed that women from Benishangul Gumuz and SNNPR were more likely to experienced earlier visit than women from Tigray region (Table 2).

Women who had media access in their surroundings odds ratio is AOR = 2.4 with p-value 0.04, which implies that women who had media access were 2.4 times more likely to experienced ANC visit in the first three months of gestation compared to women without any media access in their surroundings. The odds ratio for women who had their own works AOR = 0.69 with p-value 0.0001 and for house wives AOR = 0.75 with p-value 0.01, which implies that women who had their own work and house wives were 0.69 and 0.75 times less likely to visit early antenatal care compared to women who has no work respectively. The distance from home to health facility was big problem odds ratio AOR = 0.43 with p-value 0.03, it revealed that women who had big distance problem were 0.43 times less likely to experienced antenatal care visit in the first three months compared to women who had no distance problem. The odds ratio for women whose wealth index richer is AOR = 1.29 with p-value 0.0001, this result revealed that women from richer wealth index is 1.29 times more likely to visit earlier than women were from poorer.

The odds ratio for women having pregnancy complication is AOR = 1.29 with p-value 0.0001, which implies that women with pregnancy complication were 1.29 times more likely to attend antenatal care service within the first three months than women without pregnancy complication. Women who had planned to have pregnancy odds ratio is AOR = 1.26, it implies that women who planned to have pregnancy were 1.26 times more likely to attend the first ANC visit earlier compared to mothers who were not planned to have pregnancy (Table 2).

### **Discussion**

In this study, both descriptive and inferential analyses introduced to identify the highly significant variables those influences the early booking of pregnant women in rural parts of country. According to the World Health Organization (WHO) recommendation, every pregnant mother should start ANC booking during the first trimester of pregnancy (Irene M, 2009) . However, several studies done in Ethiopia revealed that a significant proportion of women from rural Ethiopia do not start ANC according to the WHO recommendation (Teshale A., 2020; Feleke G., 2015).

**Table 1. Descriptive summaries of timing of the first ANC visit and associated risk factors (EDHS 2016)**

		Timing of first ANC in months		Total
		Early (≤ 3 months)	Late (> 3 months)	
Variables	Categories	Frequency (%)	Frequency (%)	Frequency (%)
Maternal age	15-19	65(36.7)	112(63.3)	177(5.77)
	20-24	238(34.8)	446(65.2)	684(22.32)
	25-29	273(31.9)	583(68.1)	856(27.93)
	30-34	176(27.2)	470(7.8)	646(21.08)
	35-39	119(26.4)	332(73.6)	451(14.71)
	40-44	53(29.3)	128(70.7)	181(5.91)
	45-49	22(31.4)	48(68.6)	70(2.28)
Women occupation	Not working	495(29.3)	1192(70.7)	1687(55.04)
	Employed	11(52.8)	10(47.2)	21(0.69)
	Private work	172(35.9)	30(64.1)	479(15.63)
	House wives	215(31.8)	462(38.2)	677(22.09)
	Others	53(26.4)	148(73.6)	201(6.56)
Women education level	No education	540(28.7)	1340(71.3)	1880(61.34)
	Primary	315(32.1)	664(67.9)	980(31.97)
	Secondary & above	91(44.4)	144(55.6)	205(6.69)
Marital Status	Single	444(28.9)	1092(71.1)	1536(50.11)
	Married	372(30.5)	846(69.5)	1218(39.74)
	Widowed	81(38.8)	128(61.2)	209(6.82)
	Divorced	49(48)	53(52)	102(3.33)
Region	Tigray	144 (30.3)	332(69.7)	476(15.53)
	Afar	58(27.9)	150(72.1)	208(6.79)
	Amhara	152(37.6)	252(62.4)	404(13.18)
	Oromia	117(26.7)	321(73.3)	438(14.29)
	Somalia	63(29.6)	150(70.4)	213(6.95)
	Benishangul	76(22.6)	260(77.4)	336(10.96)
	SNNP	110(20.4)	430(79.6)	540(17.62)
	Gambela	71(40.8)	103(59.2)	174(15.68)
	Harari	82(55.4)	66(44.6)	148(4.83)
	Dire Dawa	73(57.4)	55(43.0)	128(4.18)
Media access	No	781(29.3)	1886(70.7)	2667(87.01)
	Yes	165(44.8)	233(58.5)	398(12.98)
Wealth index	Poorer	457(28.5)	1149(71.5)	1606(52.40)
	Middle	208(32.9)	424(67.1)	632(20.62)
	Richer	281(34)	546(66)	827(26.98)
Pregnancy termination	Yes	86(28.8)	213(71.2)	299(9.76)
	No	860(31.1)	1906(68.9)	2766(90.24)
pregnancy complication	Yes	424(33.5)	842(66.5)	1266(41.31)
	No	522(29.0)	1277(71.0)	1799(58.69)
Husband occupation	Not working	77(31.4)	168(68.6)	245(7.99)
	Employed	47(41.6)	66(58.4)	113(3.69)
	Private work	199(29.8)	468(71.2)	667(21.76)
	Farmers	513(30.9)	1147(69.1)	1660(54.16)
	Others	110(29.0)	270(71)	380(12.40)
Husbands education level	No education	416(29.6)	989(70.4)	1405(45.84)
	Primary	356(29.2)	862(70.8)	1218(39.74)
	Secondary & above	174(39.4)	268(60.6)	442(14.42)
Distance from health facility	No problem	112(29.7)	265(70.3)	377(12.30)
	Big problem	462(31.5)	1004(68.5)	1466(47.83)
	Not a big problem	372(30.4)	850(69.6)	1222(39.87)
Peer influence	No problem	33(35.1)	61(64.9)	94(3.07)
	Big problem	276(31.1)	612(68.9)	888(28.97)
	Not a big problem	637(30.6)	1446(69.4)	3065(67.96)
Plan of pregnancy	Planned	872(31.2)	1924(68.2)	2796(91.2)
	Not planned	74(27.5)	195(72.5)	269(8.78)

**Table 2. Binary logistic regression Analysis result of timing of first ANC visit in rural Ethiopia (EDHS 2016)**

Variables	Categories	Estimates	AOR (95% CI)	p-value
Women education level	No education		1	
	Primary	0.07	1.07 (0.89, 1.13)	0.48
	Secondary and above	0.42	1.52(1.09,2.34)	0.02*
Maternal age	15-19		1	
	20-24	0.12	1.13(0.79,1.61)	0.50
	25-29	0.20	1.22(0.85,1.73)	0.28
	30-34	0.45	1.57(1.07,2.27)	0.02*
	35-39	0.44	1.56(1.04,2.31)	0.03*
	40-44	0.36	1.44(0.89,2.32)	0.13
	45-49	0.22	1.244(0.67,2.36)	0.50
Region	Tigray		1	
	Afar	-0.14	0.88(0.59,1.29)	0.49
	Amhara	-0.34	0.71(0.53,0.95)	0.02*
	Oromia	0.15	1.16(0.86,1.57)	0.34
	Somali	-0.19	0.82(0.57, 1.20)	0.31
	Benishangul Gumuz	0.43	1.53(1.11,2.14)	0.01 *
	SNNPR	0.49	1.63(1.21,2.21)	0.00*
	Gambela	-0.51	0.60(0.41, 0.87)	0.01*
	Harari	-1.01	0.36(0.24,0.54)	0.00*
	Dire Dawa	-1.38	0.25(0.16,0.38)	0.00*
Media access	No		1	
	Yes	0.88	2.4 (1.34,2.85)	0.04*
Women occupation	No work		1	
	Employed	-0.25	0.78(0.30,2.01)	0.61
	private workers	-0.37	0.69(0.55,0.87)	0.00*
	House wives	-0.29	0.75(0.60,0.93)	0.01*
	Others	-0.03	0.97(0.69,1.38)	0.85
Distance from health facility	No problem		1	
	Big problem	-0.32	0.43(0.35,0.83)	0.03*
	Not big problem	-0.12	0.89(0.53, 2.31)	0.13
Wealth index	Poorer		1	
	Middle	0.13	1.13(0.91,1.53)	0.12
	Richer	0.26	1.29(1.03,1.51)	0.00*
Pregnancy complication	No		1	
	Yes	0.26	1.29(1.03,1.51)	0.00*
Plan for pregnancy	No		1	
	Yes	0.23	1.26(0.61,2.12)	0.02*

AOR: adjusted odds ratio, CI: confidence interval, \*significant at 5%

were 2.8 times more likely late than urban women and from total participants, 56% of rural and 27% of urban residents were booked first ANC after 16 weeks of gestation. It also showed that more than half of women visited antenatal care service in the first trimester, which implies that women who were residing in the urban were experienced ANC service early than rural residing women (Ewunetie et al., 2018). This might be due to socio-demographic, Fertility related and ANC related characteristics as evidence by the fact that majority of pregnant women had no education and only attained primary school; more than half of women living in rural areas were house wives as compared to urban residents of Ethiopian.

Thus, this study attempted to assess factors that determine timing of the first antenatal care visit and associated risk factors in rural parts of Ethiopia. In our study, about 31% of the pregnant women initiated antenatal care at or before three months of gestation, which agree with the study done in Ethiopia about the changes over-15 year span 32% (Ousman SK, 2019) and Vietnam rural mothers (Toan TK., 2012). However, this study result is inconsistent with the study done in Nepal, which revealed that 70% of pregnant mothers received first ANC within the first four months (Yuba R., Trishna J., Suresh M., 2017). From mothers who were not attended education, only 28.7% contacted to the health professional and booked for first ANC visit earlier. In our study, 31.8% of housewife mothers followed their first ANC within the first trimester, this study result is in line with the study conducted in Gonder town which revealed that from pregnant mothers who were unable to read and write, only 28% received first ANC within the first three months. This study also revealed that 31.7% of house wife women booked for their first ANC timely (Gudayu et al., 2014). Only 27.5% of respondents who had no plan for the pregnancy were booked for their first antenatal care check early. The study done in South Gondar which showed that from those mothers who had no plan for the pregnancy, only 17.3% used the opportunity to early receive their first ANC contact within the first trimester (Wolde et al., 2019).

Women who had private business work and house wives had decreased odds of booking ANC early than those women who had no work. The evidence may be the workload of housewives in the house and the lack of time to visit health facilities. In addition, the private business worker were not initiated for ANC service early, due to lack of time, and busy to fulfill basic needs for their families, this result is consistent with study done in Addis Zemen primary hospital South Gondar (Wolde et al., 2019) and in Tanzania (Njiku F., 2017). Pregnant women from richer household were 1.29 times more likely to attend early for their first ANC booking as compared to their counterparts with women from poorer household and this result is in line with the study done in Gamo Gofa Zone, South Ethiopia (Feleke G., 2015). Women in rural areas with age group 30-39 were more likely to have antenatal care services visit early compared women in age group 15-19, this result agreed with the study found in North West Ethiopia (Mulat G., 2015).

Women who had media access were more likely to experienced early booking of the first ANC service, this outcome is in line with the study conducted in Ethiopia on changes over-15-year span using 2005, 2011 and 2016 Ethiopian Demographic Health Survey (Ousman SK, 2019). Women having plan for pregnancy were more likely initiated for first antenatal care booking timely compared to those women who didn't have no plan for the pregnancy, this outcome is in line with preceding study conducted in Bahir Dar, Tigray and South Africa (Yibeltal A., 2018) (Lerebo W., 2015; Ebonwu J. et al., 2018). This might be due to when the mother wanted the pregnancy, she is ready to keep the health of the baby and as the result they are happy to attain the contact timely.

Mothers having distance problem were less likely to be booked early compared with those mothers who had no distance problem, this finding is in line with the prior studies conducted in Ethiopia (Teshale A., 2020) and Cameron (Tolefac PN et al., 2017). Women having secondary and above educational level were more likely to attend ANC service within the first three months, this study is consistent with a study done in North West Ethiopia (Ewunetie et al., 2018), Gondar (Belayneh T., 2014), Kembata Tambaro zone (Tekelab T., 2014), Tanzania (Gross K., 2012) and Ghana (Tayie FA., 2008). There might be high chance for educated mothers to have an information access about antenatal

care service than those uneducated mothers. Mothers who had pregnancy complication more likely to attend their first ANC early compared to those who did not have any pregnancy complication. This result agreed with several studies done in Axum town (Gebresilassie et al., 2019), Mekelle (Fisseha G., 2015) and Benin (Ouendo E-M, 2015). This might be because of antenatal care is perceived by the mothers as medicinal rather than the preventive measure that is why the mothers start ANC timely if they get any pregnancy related illness.

## **Conclusion**

There is high prevalence of late antenatal care visit in Ethiopia especially in the rural area still now. In our study, we have identified the factors those determine the early timing of antenatal care service of the pregnant women in rural parts of Ethiopia. Mothers who were uneducated, having private business work, having distance problem, lack of media, having poorer economic status and having unplanned pregnancy were significantly associated with decreased odds of early timing of first antenatal care visits. According to the findings the listed categories of variables were highly influenced the timing of antenatal care visit within first three months of gestation.

## **Recommendations**

Pregnant mother have to attend ANC service even though she had no pregnancy complication. The next recommendation will be education, which is a key strategic area addressed by the ministry of education of Ethiopian in improving women's awareness towards ANC during a pregnancy. Poverty reduction is another area of intervention that needs addressed by the concerned body of Ethiopian government. Expansion of infrastructure among the rural community needs prioritization by the concerned body of Ethiopian government, to improve ANC service utilization. Government of Ethiopia has to expand the media coverage related to ANC throughout the country and mothers have to be aware of the importance of ANC during pregnancy. Awareness should be given for all women in the reproductive age group about timely booking within the first three months. The Central Statistical Agency, recommended including variables that discussed in literature review that may affect utilization of ANC visits.

## **Limitation of the Study**

The study used data from national surveys that have inherent gaps such as absence of some variables that may affect the response variable and some variables are not included because of large number of missing values like parity. Another potential limitation of this study was the cross-sectional nature of the analysis. The study uses reported characteristics of mothers that may vary within time.

## **Abbreviations**

ANC: Antenatal Care

EDHS: Ethiopian Demographic and Health Survey

WHO: World Health Organization

## **Declarations**

## **Ethics Approval And Consent To Participate**

Ethical clearance for this study was obtained from Ethiopian Health and Nutrition Research Institute (EHNRI) Review Board, the National Research Ethics Review Committee (NRERC) at the Ministry of Science and Technology, the Institutional Review Board of ICF International, and the communicable disease control (CDC). The author requested access to the data from demographic health survey program team and access was granted to use the data for this study.

### **Consent for Publication**

Not applicable.

### **Availability of Data and Materials**

The datasets used in this study available from the corresponding author on reasonable request.

### **Competing Interest**

The authors declare that there is no competing interest.

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### **Authors' Contributions**

All authors designed the study, participated in the data extraction, performed analysis, interpreted results, drafted, and revised the manuscript. Finally, all authors read and approved the manuscript.

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