

Factors Determining Knowledge and Preventive Practice of COVID 19 Pandemic among Pregnant Women at Public Health Facilities: A Multicenter Cross-Sectional Study

Mamaru Fetene*, Addisu Andualem Ferede, Keralem Anteneh Bishaw

Department of Midwifery, College of Medicine and Health Science, Debre Markos University, Debre Markos, Ethiopia

ABSTRACT

Background: Due to their dread of this pandemic, which directly threatens both the mother's and baby's health, most pregnant women skip out on their prenatal appointments and deliveries at medical facilities.

Objectives: Assessing knowledge, preventive practice, and associated factors among pregnant women attending antenatal care towards COVID-19 at public health facilities of east Gojjam zone, 2020.

Methods: Between December 1 and December 30, 2020, 847 pregnant women participated in a multi-center cross-sectional study. The sampling process involved multiple stages. A pre-tested interviewer-administered questionnaire was used to collect the data, which were then input into Epi Data version 4.6 and analyzed using SPSS version 25. To investigate the relationships between knowledge, COVID-19 prevention practices, and predictor variables, bivariable and multivariable logistic regression models were used. Statistical significance was determined using an odds ratio with a 95 percent confidence level and a P-value of 0.05.

Results: Of 806 study participants, 416 (51.6%) 95% CI (48.15, 55.05), and 354 (43.9%) with 95% CI (40.47, 47.33) of pregnant women had adequate knowledge and good preventive practice against COVID-19 pandemic respectively. Urban residents (AOR=1.91, 95% CI: 1.30-2.79), civil servant (AOR=2.29, 95% CI: 1.20-4.37), secondary school and college and above (AOR=1.96, 95% CI: 1.14 - 3.40), and (AOR= 2.97, 95% CI: 1.56 - 5.65), favorable attitude (AOR=2.10, 95% CI: 1.51-2.91) were the predictors of knowledge towards Corona virus infection. Urban residents (AOR=1.54, 95% CI: 1.07-2.22), civil servant (AOR=1.81, 95% CI: 1.02 - 3.20), merchant (AOR=1.86, 95% CI: 1.16 - 2.99), and employed in private (AOR=1.97, 95% CI: 1.07 - 3.64), had medical problems (AOR=1.69, 95% CI: 1.07-2.65), adequate knowledge (AOR=1.67, 95% CI: 1.23-2.28) and favorable attitude (AOR=1.74, 95% CI: 1.26-2.42) were positively associated factors against Corona virus pandemic.

Conclusions and recommendations: Attendees at ANC had a generally adequate level of general awareness of pregnant women, but there was a poor application of these COVID-19 prevention strategies. To break the chain of transmission, increased education and implementation of preventive measures will be necessary. Continuous mass media program mobilization and health education for people with medical issues, no formal education, housewives, and rural residents should be taken into account.

Key words: Corona virus, Knowledge, Pregnant woman, Preventive practice, Ethiopia

INTRODUCTION

The novel coronavirus (COVID-19) pandemic is a disease caused by severe acute respiratory syndrome, which exponentially increases in the world among infected persons [1]. In Wuhan, China majority (64.6%) of the pregnant women were absent from their antenatal

follow-up and did not use all the personal protective equipment as a preventive measure [2]. Even though the virus affects all groups of people, pregnant women are particularly vulnerable due to physiological changes and impaired cellular immunity during pregnancy, which increases the risk of respiratory infection [3, 4].

*Correspondence to: Mamaru Fetene, Department of Midwifery, College of Medicine and Health Science, Debre Markos University, Debre Markos, Ethiopia, E-mail: marugetie@gmail.com

Received: 22-Jun-2023, Manuscript No. JWH-23-25435; Editor assigned: 26-Jun-2023, PreQC No. JWH-23-25435 (PQ); Reviewed: 11-Jul-2023, QC No. JWH-23-25435; Revised: 21-Jul-2023, Manuscript No. JWH-23-25435 (R); Published: 25-Jul-2023, DOI: 10.35248/2167-0420.23.12.665

Citation: Fetene M, (2023). Factors Determining Knowledge and Preventive Practice of COVID 19 Pandemic among Pregnant Women at Public Health Facilities: A Multicenter Cross-Sectional Study. J Women's Health Care. 12(7):664.

Copyright: © 2023 Fetene M. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited

Pregnant women face preterm delivery due to COVID-19, and preventive measures should be considered [5, 6].

Restricting movements, physical distancing, routine screening, isolation of infected persons, using sanitizers, hand hygiene, environmental monitoring, and appropriate use of personal protective equipment like face masks are the recommended WHO and international labour organization preventative measures for COVID-19 [7]. COVID 19 imposes stress and depression among pregnant women resulting in miscarriage, preterm birth, low birth weight, and fetal death [8]. When pregnant women become infected, they require more hospitalization, intensive care unit admission, and mechanical ventilation, which affect the mode of delivery and breastfeeding and increase the physical burden of the pregnancy, resulting in psychological-emotional challenges [9]. This virus makes black pregnant women more worried about their receiving antenatal care, access to food, medication, birth experience, and baby care [10].

In low and middle-income countries, COVID 19 affects maternal and newborn health by decreasing the number of pregnant women attending prenatal care and institutional delivery [11]. The knowledge of pregnant women aids in reducing the negative attitude of the clients and increasing pandemic prevention measures [12]. Since knowledge regarding the pandemic is the determinant factor for pregnant women, health education to alleviate the fear of the pandemic is mandatory to achieve a successful pregnancy [13]. Adherence to COVID 19 preventive measures among pregnant women is insufficient. So, awareness creation through media and health education is necessary [14, 15].

Therefore, the study aimed to knowledge, preventive practice, and associated factors towards COVID-19 among pregnant mothers attending antenatal care at public health facilities in East Gojjam Zone.

METHODS AND MATERIALS

Study Setting, Design and Period

An institution-based cross-sectional study was conducted from December 1-30, 2020 in public health facilities of the East Gojjam zone in the Amhara regional state. With population projection from the 2007 census, East Gojjam Zone has a total population of 2,153,937, of whom 1,066,716 are men, 1,087,221 are women. East Gojjam Zone has been divided into 19 districts and 468 kebeles. The zone had ten (10) hospitals, 103 health centers, and 423 health posts. Of these, one general and one comprehensive specialized hospital are available.

Sample Size determination

The sample size of the study was determined by using a single population proportion formula based on the following assumptions.

$$n = \frac{(Z\alpha/2)^2 p(1-p)}{d^2} \text{ Where: } n = \text{desired sample size}$$

$Z\alpha/2$ is the critical value corresponding to the desired level of the confidence interval of 95% ($Z\alpha/2=1.96$).

d =margin of error = 5 % (0.05)

P =is the estimated population proportion take p as 50%.

$$n = \frac{(1.96)^2 0.5 \times (1-0.5)}{(0.05)^2} = 384.16 \sim 385.$$

Considering design effect 2 and 10% non-response rate, the final sample size was 847.

Sampling Technique and Procedure

A multistage sampling technique was used. There are 103 health centers, 8 primary hospitals, and 1 general and comprehensive specialized hospital in the study area. First, stratification was done based on the level of the health facility. Then one-third from each type of health facility was taken by simple random sampling technique using a lottery method. Then, the proportional allocation for each health facility was done to allocate the sample size based on the case flow seen in the last month's registration report. Finally, each study participant was selected using a systematic sampling technique for every 2nd pregnant woman after selecting randomly the 1st sample from 1 and 2.

Measurements and Operational Definitions

The dependent variables were knowledge and preventive practice regarding COVID-19. Adequate knowledge among pregnant women was considered when pregnant women scored greater than or equal to the mean values of knowledge-related questions. Pregnant women who scored greater than or equal to the mean values of practice-related questions had good preventive practice about COVID 19.

Data Collection Tools and Procedures

An interviewer-administered questionnaire was used to collect data from study participants. The questionnaire was adapted from reviewed literature [16-19] with modification and contextualized into the local setting. The questionnaires consist of socio-demographic characteristics, obstetrics and reproductive history of study participants, and knowledge and practice assessment questions regarding Covid-19 pandemic disease. Under the supervision of MSc midwives, BSc midwives collected the study's data.

Data Quality Control

Emphasis was given to the data collection to assure the data quality. The questionnaire was first written in English, then translated into the study participants' native tongue, Amharic, and finally back into English. Before data collection, the supervisors and data collectors received training. A pre-test was conducted on 5% of the estimated sample size at Finote Selam General Hospital, which shares socio-demographic characteristics with our study group, to evaluate the suitability of phrasing, clarity of the questions, and responder attitude to the questions and interviewer. The questionnaire was reviewed, and confirmed for completion.

Data Processing and Analysis

The collected data were rechecked, coded, and entered into a computer by EpiData version 4.6. And exported to SPSS version 25.0 for analysis. Descriptive statistics were computed to determine frequencies and summary statistics (percentage) to describe the study population about socio-demographic and other relevant variables. Data were presented using tables and figures. Bivariable logistic regression was used to check variables having an association with the dependent variable, and then those variables having a p -value of ≤ 0.25 were fitted to multivariable logistic regression for controlling the effects of confounders. A P -value of < 0.05 with a 95% confidence level was used to declare a significant association of independent variables with the dependent variable. The model fitness was checked by the Hosmer-Lemeshow goodness of fit test.

Ethical Consideration

The ethical review committee for the College of Health Sciences at Debre Markos University granted its approval. The formal letter from the institutional review committee of health Science College has been submitted to Amhara regional health bureau, and this body sent the letter to the Zonal health bureau. The East Gojjam zone health bureau granted permission to the concerned bodies of the health facilities. After providing respondents with information about the study, they provided informed written consent. A legally recognized representative of people less than 18 also provided written informed consent. The confidentiality of the study participants was kept anonymous.

RESULTS

Socio-demographic characteristics of study participants

Out of 847 sampled pregnant women, 806 responded to the questionnaires making a response rate of 95.2%. The majority of 285 (35.4%) study participants were aged between 25-29 years. The mean age of study participants was 27.57 ±6.080 years. 763(94.6%) of the study participants were married. More than half, 426 (52.9) of the study participants were urban residents. About 42.6% of study participants didn't attend formal education. Nearly half of 329 (40.8%) of the study participants reported their monthly income worsened in the past three months before the study [Table 1].

Table 1: Socio-demographic characteristics of pregnant women attending ANC at public health facilities of East Gojjam Zone, Northwest Ethiopia, 2020(n =806).

Variables	Category	Frequency	Percent (%)
Age	15-19	59	7.3
	20-24	199	24.7
	25-29	285	35.4
	30-34	130	16.1
	≥35	133	16.5
Marital status	Married	763	94.6
	Divorced	15	1.9
	Single	4	0.5
	Widowed	24	3
Residence	Rural	380	47.1
	Urban	426	52.9
Level of education	No formal education	343	42.6
	Primary	169	21
	Secondary	105	13
	Diploma and above*	189	23.4
Occupation	Housewife	498	61.8
	Civil servant	148	18.4
	Private business	103	12.8
	Private employee	57	7
Average Monthly income	≤1000	126	15.6
	1001-3000	386	47.9
	3001-10000	292	36.2
	>10000	2	0.2
Situation of monthly income in the past three months	Worsened	329	40.8
	Improve	98	12.2
	Remain the same	379	47

Obstetrics and reproductive history of study participants

This study reported that about 501 (62.2%) and 327 (40.6%) study participants were multigravidas and nulliparous, respectively. Regarding the condition of abortion, about 70 (8.7%) of respondents had a history of abortion [Table 2].

Knowledge of study participants towards COVID-19 pandemic

This study revealed that 416 (51.6%) pregnant women had adequate knowledge about the COVID-19 pandemic with 95% CI (48.15, 55.05). Each study participant (100%) had heard of COVID-19, and about four-fifth (81.6%) of them knew that it is a viral disease. More than ninety (90.3%) of the participants said that COVID-19 could not transmit during breastfeeding. Fever, cough, and headache were the three COVID-19 symptoms were most frequently mentioned by 67%, 68.6%, and 38.3% of respondents, respectively [Table 3].

Practice of pregnant women against COVID-19 prevention

Of 806 pregnant women interviewed about COVID-19 preventive measures, 514 (63.8%) wash their hands using soap and water, 410 (50.1%) wear a face mask when they were in public congregation, 156 (19.4%) kept their social distance, and 361 (44.8%) did not participate in public meetings. This study also reported that 354 (43.9%) pregnant women had good preventive practices for COVID-19. with 95% CI (40.47, 47.33) [Table 4].

Table 2: Obstetrics related characteristics of pregnant women attending ANC at public health facilities of East Gojjam Zone, Northwest Ethiopia, 2020(n =806).

Variables	Category	Frequency	Percent
Gravidity	Primigravida	305	37.8
	Multigravida	501	62.2
Gestational age	<37 wks.	739	91.7
	≥ 37 wks.	67	8.3
Parity	Nulliparous	327	40.6
	Primipara	170	21.1
	Multipara	309	38.3
Number of children	< 3	552	68.5
	≥3	254	31.5
History of abortion	Yes	736	91.3
	No	70	8.7

Table 3: COVID-19 knowledge of pregnant women attending ANC at public health facilities of East Gojjam Zone, Northwest Ethiopia, 2020 (n =806).

Knowledge on COVID-19	Response	Frequency	Percent (%)
Ever heard about COVID-19	Yes	806	100
	No	0	0
COVID-19 is a viral disease	Yes	658	81.6
	No	148	18.4
Knowledge on transmission COVID-19*			
Coughing /sneezing	Yes	490	60.8
	No	316	39.2
Direct contact with COVID-19 patient	Yes	470	58.3
	No	336	41.7
Eating contaminated meat/food items	Yes	249	30.9
	No	557	69.1
Mother to the fetus during pregnancy	Yes	142	17.6
	No	664	82.4
During breast feeding	Yes	78	9.7
	No	728	90.3
Person with COVID-19 can transmit to others without development of manifestations	Yes	171	21.2
	No	635	78.8
Incubation period 2-14 days	Yes	243	30.1
	No	563	69.9
Knowledge on risk perception of COVID-19*			
Pregnant women are at high risk than others if infected with COVID-19	Yes	282	31.5
	No	524	68.5
Patients with co-morbidities disease are at high risk than others if infected with covid-19	Yes	435	54
	No	371	46
Children individuals are high risk than others if infected with covid-19	Yes	254	21.2
	No	552	78.8
Older people are high risk than others if infected with covid-19	Yes	400	49.6
	No	406	50.4
Knowledge of signs and symptoms of COVID-19*			
Fever	Yes	540	67
	No	266	33
Cough	Yes	553	68.6
	No	253	31.4
Headache	Yes	309	38.3
	No	497	61.7
Sore throat	Yes	149	18.5
	No	657	81.5

Runny nose	Yes	160	19.9
	No	646	80.1
Difficulty breathing	Yes	283	35.1
	No	523	64.9
Diarrhea	Yes	66	8.2
	No	740	91.8
Knowledge of preventive measures*			
Frequent hand washing with water and soap/ alcohol based hand sanitizer	Yes	502	62.3
	No	304	37.7
Avoid unnecessary travel	Yes	471	58.4
	No	335	41.6
Avoid close contact with an infected one	Yes	574	71.2
	No	232	28.8
Avoid touching your eye, nose, mouth with unwashed hands	Yes	508	63
	No	298	37
Wear mask in public	Yes	517	64.1
	No	289	35.9
Avoid crowded place	Yes	483	59.9
	No	323	40.1
Cure of COVID-19	Yes	137	17
	No	669	83
Vaccine of COVID-19	Yes	237	29.4
	No	569	70.6

Table 4: Practice towards COVID-19 preventive measures among pregnant women attending ANC at public health facilities of East Gojjam Zone, Northwest Ethiopia, 2020(n =806).

Practice related questionnaires	Response	Frequency	Percent (%)
Wash hand with soap and water / hand rub with sanitizers?	Yes	514	63.8
	No	292	36.2
Wear face Mask in public	Yes	410	50.1
	No	396	49.1
Avoid touching your eyes, nose, and mouth unwashed hand	Yes	309	38.3
	No	497	61.7
Avoiding hand shaking with others	Yes	408	50.6
	No	398	49.4
Covering mouth and nose during coughing or sneezing	Yes	410	50.9
	No	396	49.1
Stay at home during the transmission period	Yes	277	34.4
	No	529	65.6
Throw the tissue in the trash	Yes	403	50
	No	403	50
Maintain at least 2-meter distance from others	Yes	156	19.4
	No	650	80.6
Don't participate in public meetings	Yes	361	44.8
	No	445	55.2

Factors associated with knowledge of pregnant women

In this study, the odds of having good knowledge of COVID-19 among pregnant women who were residing in urban settings had 1.91 times better knowledge of COVID-19 compared to pregnant women who were living in rural areas (AOR=1.91, 95 CI: 1.30-2.79).

In the current study, the odds of having good knowledge of COVID-19 among pregnant women who were civil servants were

2.29 times more likely compared to pregnant women having other occupations (AOR=2.29, 95% CI: 1.20-4.37).

Based on educational status, the odds of having good knowledge of COVID 19 among pregnant women who had an educational level of secondary school and college and above were 1.96 and 2.97 times more likely as compared to those who had no formal education (AOR=1.96, 95% CI: 1.14 - 3.40), and (AOR= 2.97, 95% CI: 1.56 - 5.65) respectively.

The present study revealed that the odds of having good knowledge about COVID 19 among pregnant women who had a favourable attitude were 2.10 times more likely than their counterparts (AOR=2.10, 95% CI: 1.51-2.91) [Table 5].

Associated factors of COVID-19 preventive practice

Pregnant urban residents were 1.54 times more likely than non-urban residents to have good COVID-19 pandemic prevention practices (AOR=1.54, 95% CI: 1.07-2.22).

This study showed that the odds of having good prevention practices for COVID 19 among pregnant women who were civil servants (AOR=1.81, 95% CI: 1.02 - 3.20), merchants (AOR=1.86, 95% CI: 1.16 - 2.99), and others (AOR=1.97, 95% CI: 1.07 - 3.64)

had 1.81, 1.86 and 1.97 times more likely as compared to pregnant women who were housewife respectively.

The odds of having good preventive practice for COVID 19 among pregnant women who had medical problems had 1.69 times more likely than their counterparts (AOR=1.69, 95% CI: 1.07-2.65)

In the present study, the odds of having good preventive practices about COVID-19 among pregnant women who had adequate knowledge had 1.67 times more likely compared to those who had inadequate knowledge of COVID-19 (AOR=1.67, 95% CI: 1.23-2.28).

The odds of Pregnant women who had favourable attitude had 1.74 times better preventive practice towards COVID-19 compared to pregnant women who had unfavourable attitude (AOR=1.74, 95% CI: 1.26-2.42) [Table 6].

Table 5: Bivariate and Multivariable Logistic Regression Analysis on Factors Associated with COVID-19 knowledge of pregnant women attending ANC at public health facilities of East Gojjam Zone, Northwest Ethiopia, 2020 (n =806).

Characteristics	Knowledge		COR (95%)	AOR (95%)	P-value
	Yes	No			
Residence					
Rural	139	241	1	1	
Urban	277	149	3.22(2.42 - 4.30)	1.98(1.30 - 2.79)	0.001*
Age of women					
15-19	27	33	1.45(0.78 - 2.69)	1.04(0.46-2.35)	0.931
20-24	107	93	2.04(1.30 - 3.20)	1.08 (0.58-2.01)	0.819
25-29	161	122	2.34(1.53 - 3.57)	1.30 (0.76-2.24)	0.341
30-34	73	57	2.27(1.38 - 3.72)	1.46(0.83-2.60)	0.192
≥35	48	85	1	1	
Occupation					
Housewife	199	297	1	1	
Civil servant	127	24	7.90(4.93-12.66)	2.29(1.20-4.37)	0.012*
Merchant	55	48	1.71(1.12 - 2.62)	1.03(0.63-1.68)	0.91
Employed in private	35	21	2.49(1.41 -4.40)	1.62(0.85-3.07)	0.142
Educational status					
No attending formal education	118	225	1	1	
Primary	76	94	1.54(1.06 - 2.24)	1.07(0.69 - 1.67)	0.764
Secondary	66	39	3.23(2.05 -5.08)	1.96(1.14 -3.40)	0.015*
College and above*	156	32	9.30(5.98 - 14.45)	2.97(1.56 - 5.65)	0.001*
Gravidity					
Primigravida	176	129	1.48(1.11-1.98)	1.47(0.68-3.16)	0.323
Multigravida	240	261	1	1	
GA in weeks					
<37 wks.	376	363	0.67(0.51 - 0.90)	0.99(0.52-1.86)	0.965
≥ 37 wks.	41	26	1	1	
Parity					
Nulliparous	186	141	1.79(1.31 - 2.45)	0.77(0.34 -1.74)	0.535
Primipara	99	71	1.90(1.30 - 2.77)	1.21(0.74 - 1.97)	0.456
Multipara	131	178	1	1	
Number of alive children					
< 3	233	319	3.53(2.56 - 4.87)	3.62 (0.52 -5.20)	0.426
≥3	183	71	1	1	
Attitude					
Favorable	254	158	2.30(1.74 - 3.053)	2.10(1.51-2.91)	0.000*
Unfavorable	162	232	1	1	

Key: 1 = Reference category

*= P value<0.05

Table 6: Bivariable and Multivariable Logistic Regression Analysis on Factors Associated with COVID-19 preventive measures among pregnant women attending ANC at public health facilities of East Gojjam Zone, Northwest Ethiopia, 2020(n =806).

Variables	Practice of pregnant women		COR (95%)	AOR (95%)	P-value
	Yes	No			
Residence					
Rural	260	120	1	1	
Urban	192	234	2.64 (1.98 - 3.52)	1.54(1.07-2.22)	0.020*
Age of women					
15-19	23	37	1.07(0.57-1.20)	0.60 (0.27 - 1.30)	0.193
20-24	87	113	1.32(0.84 - 2.07)	0.72 (0.40 - 1.31)	0.285
25-29	144	139	1.78(1.16-2.71)	1.06 (0.64 - 1.78)	0.817
30-34	51	79	1.11(0.67-1.82)	0.72 (0.42 - 1.24)	0.235
≥35	49	84	1	1	
Occupation					
Housewife	169	327	1	1	
Civil servant	97	54	3.48 (2.37 -5.09)	1.81(1.02 - 3.20)	0.043*
Merchant	56	47	3.05(1.500 - 3.54)	1.86(1.16 - 2.99)	0.010*
Private employee	32	24	2.58 (1.47- 4.52)	1.97(1.07 - 3.64)	0.030*
Educational status					
No formal education	108	235	1	1	
Primary	73	97	1.64(1.12 -2.39)	1.16 (.76-1.79)	0.493
Secondary	52	53	2.14(1.37-3.33)	1.19(0.70-2.01)	0.525
Gravidity					
Primigravida	155	150	1.57 (1.18- 2.09)	0.68 (0.34 -1.40)	0.297
Multigravida	199	302	1	1	
Parity					
Nulliparous	170	157	1.83(1.33-2.51)	2.11(0.98- 4.55)	0.56
Primipara	69	101	1.15(0.77 - 1.69)	0.714(0.45-1.15)	0.162
Multipara	115	194	1	1	
Medical problem					
Yes	53	49	1.45(0.96-2.20)	1.69(1.07-2.65)	0.024*
No	301	403	1	1	
Overall knowledge					
Adequate	230	186	2.65 (1.99- 3.54)	1.67(1.23-2.28)	0.001*
Inadequate	124	266	1	1	
Attitude					
Favorable	215	197	2.00 (1.51 - 2.66)	1.74(1.26-2.42)	0.001*
Unfavorable	139	255	1	1	

DISCUSSION

In Ethiopia, under the current SDG period, the welfare of mothers, newborns, and children remains a top priority for the health sector, but a significant proportion of women did not use maternity healthcare services. Having this insight in mind, we conducted. A multi-center institution-based cross-sectional study aimed to determine knowledge and preventive practice of the COVID-19 pandemic and associated factors among pregnant women attending ANC at public health facilities of East Gojjam Zone.

The proportion of pregnant women's knowledge of COVID-19 was 51.6% (95% CI 48.2, 55.1). This result is in line with the study conducted in Gondar (55%) [20], Gurage (54.84%) [21], and India (50.5%) [22].

The present study was lower than the study conducted in Wollega (75.4%) [23], Egypt (57.6%) [24], low-resource African setting (60.9%) [25], and Indian defense hospital (75.3%) [26].

This discrepancy might be the difference in socio-demographic characteristics of the study participants compared to other studies, as the majority of respondents in this study didn't attend formal education that directly affects the level of knowledge.

On the other hand, this finding was higher than the study done in Debre Tabor (46.8%) [27], South Africa (43.5%) [28], and Iraq (28%) [29] This discrepancy might be due to the difference in the study setting. The present study was facility-based compared to the study done in Debre Tabor [27]. When pregnant women go to health institutions, they get the opportunity to have some information regarding the pandemic during their ANC follow-up. Furthermore, more than half of the study's participants were urban residents who could easily update themselves on COVID-19 through social media and mass media.

Urban resident pregnant women were 1.91 times more likely to be knowledgeable about COVID-19 than their counterparts.

This could be because urban residents have greater access to new information and update themselves through various media than rural residents. Studies from Wollega, Ethiopia [23] and India [26] supported this finding.

Regarding occupation, civil servants pregnant women were 2.29 times more likely than housewives to be knowledgeable about the COVID-19 pandemic. The possible reason for this might be civil servants pregnant women are employed, educated, and work in close collaboration with the government of direction to reduce the burden of this pandemic, which increases their knowledge. The study conducted in Debre Tabor, Ethiopia [27] supported the finding.

Participants who completed secondary school and college and above were 1.96 and 2.97 times more knowledgeable about COVID-19 than those who did not attend formal education, respectively. The possible reason for this might be education is crucial and one of the most determinant factors to know and understand fruitfully. Educated pregnant women can search, read, and follow social media, which contributed to increased knowledge about the pandemic. The finding is supported by studies in [27], Wollega [23], and India [26].

Pregnant women with a favorable attitude were 2.1 times more likely than those with an unfavorable attitude to be knowledgeable about the COVID-19 pandemic. The possible evidence for this might be that the pregnant women's positive attitude makes them curious about coronavirus.

The study reported that 354 (43.9%) with 95% CI (40.5, 47.3) pregnant women had good preventive practices for COVID-19. This is in line with the study conducted in Wollega (43.6%) [23]. But this finding is lower than studies from Debre Tabor (47.6%) [27], Gondar (47.4%) [20], Guraghe (76.2%) [21], South Africa (76%) [28], Defense Hospital India (92.7%) [26] and another study in India (69.8%) [22]. In low-income countries such as Ethiopia, a lack of knowledge and access to resources leads to poor pandemic prevention practices. Variations in pregnant women's social lives across countries may have contributed to the discrepancy.

The present study was higher than the study conducted in Egypt (12.4%) [24], low-resource African setting (30.3%) [25], and Iraq (32.75%) [29]. The disparity could be attributed to a difference in the study period, as this study was conducted during the peak of COVID-19 in the country, causing pregnant women to be concerned about becoming infected and taking appropriate COVID-19 pandemic precautions. Furthermore, the majority of study participants' previous studies were farmers and rural residents, which may result in poor prevention practice due to a lack of awareness about the COVID-19 pandemic severity.

Pregnant women who reside in urban settings had 1.54 times better preventive practice for COVID-19 compared to their counterparts. This might be due to urban residents' pregnant women may have better access to information, being more educated, and can search for COVID-19 prevention methods. Studies in Guraghe, Wollega, low resource African settings, and Indian [21, 23, 25, 30] supported this evidence.

Regarding occupation, pregnant women who were civil servants, merchants, and employed in private sector were 1.81, 1.86, and 1.97 times more likely to practice COVID 19 prevention measures compared to housewives, respectively. This might be pregnant women who were housewife do not know what preventive measures are taken to avert the spread of COVID 19.

Those pregnant women with medical problems were 1.69 times more like to practice the prevention of COVID-19 When compared to their counterparts. The reason could be that pregnant women with medical problems may receive special attention and attempt to implement preventive measures against the COVID-19 pandemic.

Pregnant women with adequate knowledge of COVID-19 practiced 1.67 times better prevention than pregnant women with inadequate knowledge. The possible explanation for this might be knowledge is a prerequisite for applying preventive measures for COVID-19 pandemic. Studies in Ethiopia, South Africa, and India [20, 22, 28], supported this finding, respectively.

The study revealed that pregnant women with a favorable attitude were 1.74 times practicing good prevention of COVID-19 methods compared to their counterparts. The reason might be that when pregnant women have a good feeling about COVID-19 prevention, they are more likely to implement the techniques of the global infection prevention strategies.

This study was used primary data as a source of information to get a reliable data. The study was covered majority of the public health facilities in the zone. The nature of the design did not show the cause effect relationship of the factors. Due to the sensitivity of the COVID-19, the study had low response rate.

COVID-19 pandemic is the most intense and emotional experience of pregnant women's lives. Good knowledge and practice of pregnant women on COVID 19 contributes to filling the gap of preventive measures. The most determinant segment in the management of communicable disease is focusing on vulnerable targeted groups like pregnant women through evaluation of their knowledge and preventive practice.

CONCLUSIONS AND RECOMMENDATIONS

The finding of this study showed that the knowledge and preventive practice against Corona virus pandemic among pregnant women attending ANC was 51.6% and 43.9% respectively. Intensified education and enforcement of the preventive measures will be required to interrupt the chain of transmission since the level of knowledge seems not to translate to the actual practice of preventing the pandemic. Continuous mass media program mobilization and health education should be considered for those who had medical problems, did not attend formal education, housewife, and rural resident women. Additional qualitative and observational studies that include pregnant women attending private health institutions might be advisable.

ABBREVIATIONS

ANC: Antenatal Care

AOR: Adjusted Odds Ratio

COVID-19: Coronavirus Disease of 2019

CI: Confidence Interval

COR: Crude Odd Ratio

SPSS: statistical package for social sciences

AVAILABILITY OF DATA AND MATERIALS

All the data included in the manuscript can be accessed from the corresponding author with reasonable query

COMPETING INTERESTS

The authors declare that we have no competing interests

FUNDING

There is no funding agency that supports this study

AUTHORS' CONTRIBUTIONS

AA, MG and KA conceptualized, designed, and wrote the proposal, trained data collectors and supervisors, conducted analysis, wrote results, draft and finalized the manuscript. All authors read and approved the final manuscript.

ACKNOWLEDGMENT

The authors are very grateful to express their gratitude to the study participants, data collectors, supervisors, Debre Markos University Health Sciences College, East Gojjam zone, and the regional health bureau.

References

1. Yang L, Liu S, Liu J, Zhang Z, Wan X, Huang B, et al. COVID-19: immunopathogenesis and Immunotherapeutics. *Signal Transduct Target Ther.* 2020;5(1):128.
2. Ding W, Lu J, Zhou Y, Wei W, Zhou Z, Chen M. Knowledge, attitudes, practices, and influencing factors of anxiety among pregnant women in Wuhan during the outbreak of COVID-19: a cross-sectional study. *BMC Pregnancy Childbirth.* 2021;21(1):1-9.
3. Liu H, Wang LL, Zhao SJ, Kwak-Kim J, Mor G, Liao AH. Why are pregnant women susceptible to COVID-19? An immunological viewpoint. *J Reprod Immunol.* 2020;139:103122..
4. Mei Y, Luo D, Wei S, Liao X, Pan Y, Yang X, et al. Obstetric management of COVID-19 in pregnant women. *Front Microbiol.* 2020;11:1186..
5. London V, McLaren Jr R, Atallah F, Cepeda C, McCalla S, Fisher N, et al. The relationship between status at presentation and outcomes among pregnant women with COVID-19. *Am J Perinatol.* 2020;37(10):991-4.
6. Qiao J. What are the risks of COVID-19 infection in pregnant women? *The Lancet.* 2020;395(10226):760-2.
7. World Health Organization. Preventing and mitigating COVID-19 at work: policy brief, 19 May 2021.
8. Mirzadeh M, Khedmat L. Pregnant women in the exposure to COVID-19 infection outbreak: the unseen risk factors and preventive healthcare patterns. *J Matern Fetal Neonatal Med.* 2020;35(7):1-2.
9. Kok TL. Attitude and perceptions towards COVID-19 among pregnant women in Singapore: A cross-sectional survey. 2020.
10. Gur RE, White LK, Waller R, Barzilay R, Moore TM, Kornfield S, et al. The disproportionate burden of the COVID-19 pandemic among pregnant black women. *Psychiatry Res.* 2020;293:113475.
11. Naqvi F, Naqvi S, Billah SM, Saleem S, Fogleman E, Peres-da-Silva N, et al. Knowledge, attitude and practices of pregnant women related to COVID-19 infection: A cross-sectional survey in seven countries from the Global Network for Women's and Children's Health. *BJOG.* 2022;129(8):1289-97.
12. Kunno J, Yubonpant P, Supawattanabodee B, Sumanasrethakul C, Wiriyastririvaj B. Knowledge, attitudes, and practices related to the COVID-19 pandemic among pregnant women in Bangkok, Thailand. *BMC Pregnancy Childbirth.* 2022;22(1):1-1.
13. Septiasari RM, Viandika N. The correlation between covid-19 knowledge and anxiety of pregnant women during covid-19 pandemic. *Jl-KES (Jurnal Ilmu Kesehatan).* 2021;4(2):71-4.
14. Silesh M, Demisse TL, Taye BT, Desta K, Kitaw TM, Mekuria AD, et al. Compliance with COVID-19 preventive measures and associated factors among women attending antenatal care at public health facilities of Debre Berhan Town, Ethiopia. *Risk Manag Healthc Policy.* 2021:4561-9.
15. Temesgan WZ, Aklil MB, Yacob HS, Mekonnen ET, Tegegne ED, Tesfa EB, et al. Adherence to COVID-19 preventive practice and associated factors among pregnant women in Gondar city, northwest Ethiopia, 2021: Community-based cross-sectional study. *PLoS One.* 2022;17(3):e0264237.
16. Akalu Y, Ayelign B, Molla MD. Knowledge, attitude and practice towards COVID-19 among chronic disease patients at Addis Zemen Hospital, Northwest Ethiopia. *Infect Drug Resist.* 2020:1949-60.
17. Moyer CA, Compton SD, Kaselitz E, Muzik M. Pregnancy-related anxiety during COVID-19: a nationwide survey of 2740 pregnant women. *Arch Womens Ment Health.* 2020;23:757-65.
18. Anikwe CC, Ogah CO, Anikwe IH, Okorochukwu BC, Ikeoha CC. Coronavirus disease 2019: Knowledge, attitude, and practice of pregnant women in a tertiary hospital in Abakaliki, southeast Nigeria. *Int J Gynaecol Obstet.* 2020;151(2):197-202.
19. Honarvar B, Lankarani KB, Kharmandar A, Shaygani F, Zahedroozgar M, Rahmanian Haghghi MR, et al. Knowledge, attitudes, risk perceptions, and practices of adults toward COVID-19: a population and field-based study from Iran. *Int J Public Health.* 2020;65:731-9.
20. W/Mariam TG, Kassie BA, Asratie MH, Abate AT. The effects of fear and knowledge of COVID-19 on preventive practice among pregnant women who attend antenatal care in northwest Ethiopia, 2020: institution-based cross-sectional study. *Int J Womens Health.* 2021:95-100.
21. Fikadu Y, Yeshaneh A, Melis T, Mesele M, Anmut W, Argaw M. Covid-19 preventive measure practices and knowledge of pregnant women in guraghe zone hospitals. *Int J Womens Health.* 2021:39-50.
22. Indumathi P, Swain D, Priyadarshini T, Jacob J, Tigga R. Knowledge, perceived threats and protective behaviour related to COVID 19 among pregnant women. *Asian J Psychiatr.* 2022;72:103091.
23. Besho M, Tsegaye R, Yilma MT, Kasaye HK, Tolossa T, Hiko N, et al. Knowledge, attitude and practice toward corona virus infection among pregnant women attending antenatal care at public hospitals in three wollega zones, ethiopia. *Int J Gen Med.* 2021:3563-73.
24. Metwally HM, MMAEM D. Knowledge, practice and attitudes of preventive measures against coronavirus infection among pregnant women in Egypt. *Saudi Journal of Nursing and Health Care.* 2020;10.
25. Nwafor JI, Aniuoku JK, Anozie BO, Ikeotuonye AC. Knowledge and practice of preventive measures against COVID-19 infection among pregnant women in a low-resource African setting. *MedRxiv.* 2020:2020-04.
26. Kamal D, Thakur V, Swain S, Vikneshram C. Knowledge, attitude, and practice toward COVID-19 among pregnant women in a tertiary care hospital during the COVID-19 outbreak. *J Mar Med Soc.* 2020;22(3):66.
27. Ayele AD, Mihretie GN, Belay HG, Teffera AG, Kassa BG, Amsalu BT. Knowledge and practice to prevent COVID-19 and its associated factors among pregnant women in Debre Tabor Town Northwest Ethiopia, a community-based cross-sectional study. *BMC Pregnancy Childbirth.* 2021;21(1):397.
28. Hoque AM, Alam AM, Hoque M, Hoque ME, Van Hal G. Knowledge, attitudes, and practices towards COVID-19 of pregnant women at a primary health care facility in South Africa. *European Journal of Medical and Health Sciences.* 2021;3(1):50-5.

29. Abdulla TN, Akram W, MardanAbullah T. Knowledge and practice of pregnant Iraqi women about COVID-19 preventive measures. *Med Legal Update*. 2021;21(1):1217-23.
30. Kamal D, Thakur V, Swain S, Vikneshram C. Knowledge, attitude, and practice toward COVID-19 among pregnant women in a tertiary care hospital during the COVID-19 outbreak. *J Mar Med Soc*. 2020;22(3):66.