Olusola Peter Aduloju
Department of Obstetrics and
Gynaecology, Ekiti State
University, Ado-Ekiti, Nigeria

Temitope Omoladun Okunola
Department of Obstetrics and
Gynaecology, Ekiti State
University, Ado-Ekiti, Nigeria

Adeyemi Sunday Adefisan
Department of Obstetrics and
Gynaecology, Ekiti State
University, Ado-Ekiti, Nigeria

Tolulope Aduloju
Department of Medical Social
Services, Ekiti State University
Teaching Hospital, Ado-Ekiti,
Nigeria

Knowledge, attitude and practice of preventive measures against coronavirus disease 2019 among pregnant women in a tertiary health facility in southwest Nigeria

Olusola Peter Aduloju, Temitope Omoladun Okunola, Adeyemi Sunday Adefisan and Tolulope Aduloju

Abstract
Introduction: The outbreak of corona virus disease (COVID-19) affects all categories of people and has resulted in death of several thousand of them all over the world including pregnant women. Various preventive strategies have been recommended to curb further spread of the disease thus limiting the morbidity and mortality of the disease.
Objectives: This study assessed the knowledge, attitude, and practice of preventive measures against COVID-19among antenatal attendees in Ekiti State University Teaching Hospital (EKSUTH), Ado-Ekiti.
Methods: A cross-sectional study of 423 pregnant women attending prenatal care at EKSUTH between 1st April, 2020 and 31st May, 2020. Data was collected using a self-administered validated questionnaire from consenting participants on their socio-demographic characteristics, knowledge, attitude and practice of preventive measures against COVID-19. Logistic regression was done to identify determinant factors with $p<0.05$.
Results: About 87.2%, 79.2% and 74.5% of the pregnant women had good level of knowledge and practice of preventive measures as well as positive attitude towards COVID-19 respectively. The mean age, parity and gestational age of women was 28.45±5.51years, 2.21±1.61 and 27.73±8.99weeks respectively. Younger age group, higher education, being married, late trimester of pregnancy and urban residency were the significant determinants of good knowledge, attitude and practice of COVID-19 preventive measures, $p<0.05$.
Conclusion: The massive campaigns by government and non-governmental organization have tremendously created awareness among the pregnant women. These efforts should be sustained through the provision of information, education and communication materials that will further improve the compliance to the various preventive measures.

Keywords: COVID-19, knowledge, attitude, preventive measures, practice, pregnant women

1. Introduction
Coronavirus disease (COVID-19) is a new emerging infectious disease of public health importance globally caused by a novel human coronavirus (SARS-COV-2) [1]. Coronavirus disease was first identified in Wuhan City, China in December, 2019 and was declared as a global pandemic disease by World Health Organization (WHO) in March, 2020 due to its spread worldwide [2, 3]. Since declaration by WHO, there have been 49.9 million confirmed cases of COVID-19 and 1.25million deaths as at 08 November, 2020. Nigeria recorded the first confirmed case of COVID-19 as announced by Nigeria Centre for Disease Control (NCDC) on 27th February, 2020 and the number of confirmed cases and deaths has gradually increased across many States in Nigeria to 63, 790 and 1, 155 respectively.
Although majority of people are asymptomatic, individuals with confirmed SARS-CoV-2 infection develop clinical symptoms of fever, cough, and shortness of breath. Efforts have focused on describing the clinical characteristics and outcome of COVID-19 in the general population with little information on this infection during pregnancy. However, the disease particularly has worst outcome among older population aged above 65 years [4-6]. Pregnant and postpartum women are also considered high-risk group and deserve our great attention because the immune-compromised state and the physiological changes during pregnancy make them more susceptible to SARS-CoV-2 infection with increased morbidity and mortality compared to the general population [7, 8].

Corresponding Author:
Olusola Peter Aduloju
Department of Obstetrics and
Gynaecology, Ekiti State
University, Ado-Ekiti, Nigeria

COVID-19 could lead to intrauterine growth restriction, preterm delivery, abortion and stillbirth even though vertical transmission of the virus is yet to be confirmed [9, 10].

The World Health Organization recommended series of preventive measures which were adopted by the global community to contain the spread of the disease and these measures included personal hygiene such as regular hand washing and use of alcohol-based hand sanitizers, use of face masks, social distancing, ban on public gathering including worship centres and partial or total lockdown to keep people at home [11, 12]. The Nigerian government through the presidential task force on COVID-19 adopted these measures and also engaged in media campaigns to disseminate information on these preventive measures to the general public [13].

The immunosuppression in pregnancy predisposes to various infections including COVID-19. Good knowledge is a prerequisite for overall practice of preventive measures aimed at reducing disease burden, forming positive attitude and promoting positive practice to disease control [14]. Efforts towards the prevention of pregnant women and their fetuses from the scourge of COVID-19 would make more impact if they are knowledgeable about how to prevent contracting the virus and its transmission to their families and others. Therefore, it is essential that pregnant mothers and their caregivers are fully aware of the accurate facts about COVID-19 and the various preventive measures [8]. However, most studies that had assessed knowledge, attitude and the preventive measures against COVID-19 in Nigeria involved the general population and reports from these studies showed that respondents demonstrated high knowledge, positive attitude and good preventive practice among them [15-18] while the studies among the pregnant women were done in southeastern Nigeria [10, 19].

This study examined the knowledge, attitude and practice of the preventive measures against coronavirus infection among pregnant women in Ekiti State University Teaching Hospital, Ado-Ekiti, south-western Nigeria. The reports from this study will help in guiding formulation of new policies and guidelines and strengthening the existing ones that would prevent COVID-19 infections among our pregnant population in Nigeria.

2. Materials and Methods
2.1 Study site
This cross-sectional study was carried out among pregnant women attending Antenatal Clinic of the Department of Obstetrics and Gynaecology, Ekiti State University Teaching Hospital (EKSUTH), Ado-Ekiti between 1st April, 2020 and 31st May, 2020. EKSUTH is one of the three multi-specialist hospitals in Ekiti State and receives referral from the primary, secondary and private health facilities within the state and surrounding states of Ondo, Osun and Kogi states.

The antenatal clinic is held on Wednesdays and Fridays along with postnatal clinics. The clinics are run by consultant obstetricians with their teams of resident doctors and are assisted by nurses. Health talks are usually given that cover various topical issues including nutrition, diet, personal and environmental hygiene, signs of danger during pregnancy, the experience of labor, care of the newborn, exclusive breastfeeding, and immunization. Other health issues, such as hypertension, diabetes mellitus, malaria, anemia, HIV/AIDS, family planning, and contemporary health issues, are also discussed.

Routine services after the health talk included measuring weight and height, estimation of blood pressure, urinalysis, and estimation of hemoglobin. Folic acid, ferrous sulfate, intermittent prophylactic treatment (IPT), and multivitamin supplementation are prescribed. In addition, antiretroviral drugs are given to HIV positive pregnant women.

2.2 Data collection
Data were collected using a pretested structured interviewer questionnaire which was divided into sections. The first section assessed the participants' socio-demographic and obstetric characteristics such as age, marital status, education, occupation, parity, gestational age; the second section examined their knowledge about COVID - 19 such as ever heard about COVID - 19 infection, cause, symptoms, transmission, spread and prevention of the infection; and attitude towards COVID - 19 such as risk perception, stigma and misconceptions; and the third section inquired about the practice of preventive measures against COVID -19 infection such as frequent hand washing with soap and water, use of alcohol-based hand sanitizers, wearing of face mask in the public, maintenance of social distance, covering of mouth and nose during coughing or sneezing and staying at home. Each question of the knowledge and attitude towards COVID-19 and practice of preventive measures against COVID-19 was scored 0 and 1 for incorrect and correct response respectively while scores equal or above the mean score were adjudged as good knowledge, attitude and practice while scores below the mean were adjudged as poor knowledge, attitude and practice of COVID-19 preventive measures. The questionnaires were administered by trained interviewers and the questions were translated into the Yoruba language and back-translated into the English language to ensure accuracy of the intended meaning of the questions. Interviews were conducted in Yoruba language for those who cannot speak English language.

2.3 Sample size determination
The sample size was calculated using the single proportion formula determination. With a prevalence of adequate knowledge of COVID-19 preventive measures of 60.9% from a previous study by Nwafor *et al.* [19], 95% confidence interval level, 5% margin of error and 10% contingency for non-respondents, the minimum sample size was 402 pregnant women while 430 women were recruited into the study.

2.4 Data analysis
Data collected were entered into and analyzed using the IBM Statistical Package for Social Sciences (SPSS) Statistics version 22 (IBM Corp., Armonk, NY, USA). Discrete variables were expressed in frequency and percentages while numerical variables were presented in mean and standard deviation. Categorical variables were compared using Chi square test or Fischer's exact test where necessary and continuous variables were compared using student t test or ANOVA. Significant variables in bivariate analysis were entered into logistic regression model for predictors of knowledge, attitude and practice of COVID-19 preventive measures. The results were presented as adjusted odd ratio (AOR) and 95% confidential interval with the significance level set at p value < 0.05.

2.5 Ethical considerations
Ethical approval for the study was obtained from the Ethics and Research Committee of the Ekiti State University Teaching Hospital, Ado-Ekiti. The participants were adequately briefed about the study by the trained research assistants and written informed consent was obtained from those who gave consent to participate in the study. Confidentiality of the information obtained from the participants was maintained throughout the

period of study. They were informed that they were at liberty to withdraw from the study at any point without negatively affecting the quality and continuation of their care in our facility.

3. Results
A total of 423 women completed their questionnaires with a response rate of 80%. The mean age, parity and gestational age of the women who participated in the study was 28.45 ± 5.51years, 2.21 ± 1.61 and 27.73 ± 8.99 weeks respectively. Majority of the respondents, 70.2% and 60.8% were Yoruba and had tertiary form of education respectively while about three-quarters (77.5%) were living in the urban area. More than four-fifths of the women were married (81.1%), practiced Christianity (89.1%) and are employed (81.1%). Other socio-demographic characteristics are as shown in table 1.

Table two showed that majority (87.2%) of the women had good knowledge of COVID-19 even though 97.6% of them had heard about COVID-19. Television/radio (97.9%), social media (97.4%) and health workers (94.8%) were the three most common sources of information about COVID-19 by these women while fever (90.1%), cough (82%) and body weakness (70.2%) were the three commonest reported symptoms of COVID-19 by the respondents. More than three-quarters of the women responded that virus is the causative agent and human as the source of infection. Almost four-fifths (79.2%) of the women

showed good practice of the preventive measures and at least 80% of them identified the preventive measures against COVID-19.

The relationship between socio-demographic characteristics and knowledge, attitude and practice of preventive measures against COVID-19 is shown in table 3. On bivariate analysis, all the socio-demographic characteristics of the women were significantly associated with good knowledge of COVID-19; $p<0.05$; only education status (0.001), place of residence (<0.001), religion (<0.001) and gestational age (0.010) showed significant association with good attitude of the women towards COVID-19 while age of women (0.010), marital status (<0.001), education (<0.001), ethnicity (<0.001), place of residence (0.008) and gestational age (<0.001) were associated with good practice of preventive measures against COVID-19.

Table 4 showed the various determinants of good knowledge, good attitude and good practice of preventive measures against COVID-19 on logistic regression of significant factors from bivariate analysis. Age, marital status, education status, place of residence and gestational age of the women were the significant determinants of good knowledge of COVID-19, $p<0.05$, and practice of COVID-19 preventive measures while education status, place of residence and gestational age of the women were the significant determinants of good attitude towards COVID-19, $p<0.05$.

Table 1: Socio-demographic characteristics of women involved in the study

Variables	Frequency (N = 423)	Percentages (%)
Age (years)		
≤ 24	109	25.8
25-29	146	34.5
30-34	95	22.5
≥ 35	73	17.3
Parity		
0	77	18.2
1	91	21.5
2-4	213	50.4
≥ 5	42	9.9
Education		
None	38	9.0
Primary	57	13.5
Secondary	71	16.8
Tertiary	257	60.8
Marital status		
Married	343	81.1
Single	30	7.1
Divorced	22	5.2
Widowed	28	6.6
Occupation		
Unemployed	80	18.9
Self-employed	88	20.8
Private employed	89	21.0
Government employed	166	39.3
Ethnicity		
Yoruba	297	70.2
Igbo	81	19.1
Hausa	45	10.6
Place of residence		
Urban	328	77.5
Rural	95	22.5
Age (mean ± SD), years	28.45 ± 5.51	
Parity (mean ± SD)	2.21 ± 1.61	
Gestational age (mean ± SD), weeks	27.73 ± 8.99	

Table 2: Knowledge, attitude and practice of preventive measures against COVID-19

Variables	Frequency (N = 423)	Percentages (%)
Knowledge of COVID-19		
Good	369	87.2
Poor	54	12.8
Attitude towards COVID-19		
Good	315	74.5
Poor	108	25.5
Practice of preventive measures		
Good	335	79.2
Poor	88	20.8
Heard of COVID-19		
Yes	413	97.6
No	10	2.4
Sources of information [+]		
Television/Radio	414	97.9
Social Media	412	97.4
Health workers	401	94.8
Newspapers	328	77.5
Churches/Mosques	323	76.4
Internet	245	57.9
Friends	179	42.3
Causative agent		
Virus	345	81.6
Bacteria	78	18.4
Sources of infection		
Humans	327	77.3
Animals	86	20.3
Air	10	2.4
Transmission of COVID-19 [+]		
Proximity	321	75.9
Droplets	401	94.8
Surfaces	279	66.0
Body fluids	111	26, 2
Symptoms of COVID-19 [+]		
Fever	381	90.1
Difficulty in breathing	347	82, 0
Cough	297	70.2
Body weakness	123	29.1
Sneezing	113	26.7
Diarrhoea	101	23.9
Headache	97	22.9
Is COVID-19 curable?		
Yes	257	60.8
No	166	39.2
Cure for COVID-19		
Chloroquine	297	70.2
Antibiotics	43	10.2
Hot gin	33	7.8
Hot water	29	6.9
Salt water	21	5.0
Preventive measures against COVID-19 [+]		
Use of hand sanitizer	390	92.2
Wash hands with soap	389	92.0
Social distancing	372	87.9
Avoid unnecessary travels	371	87.7
Avoid touching of face	363	85.8
Avoid social gatherings	344	81.3
Use of face mask	343	81.1
Regular surface cleaning	341	80.6

[+] Multiple responses

Table 3: Association between socio-demographic characteristics of the pregnant women and their knowledge, attitude and practice of preventive measures against COVID-19

Variables	Knowledge of COVID-19			Attitude towards COVID-19			Practice of preventive measures		
	Good (n = 369)	Poor (n = 54)	p value	Good (n = 315)	Poor (n = 108)	p value	Good (n = 335)	Poor (n = 88)	p value
Age (years)									

≤ 24	99 (26.8)	10 (18.5)	0.004*	72 (18.7)	21 (19.4)	0.191	94 (28.1)	15 (17.0)	0.001*
25-29	134 (36.3)	12 (22.2)		121 (38.4)	25 (23.1)		124 (37.0)	22 (25.0)	
30-34	81 (22.0)	12 (25.9)		70 (22.2)	25 (23.1)		72 (21.5)	23 (26.1)	
≥ 35	55 (14.9)	18 (33.4)		52 (16.5)	21 (19.4)		45 (13.4)	28 (31.8)	
Parity									
0	60 (16.3)	17 (31.5)	0.011*	54 (17.1)	23 (21.3)	0.255	59 (17.6)	18 (20.5)	0.837
1	78 (21.1)	13 (24.1)		70 (22.2)	21 (19.4)		72 (21.5)	19 (21.6)	
2-4	196 (53.1)	17 (31.5)		164 (52.1)	49 (45.4)		172 (51.3)	41 (46.6)	
≥ 5	35 (9.5)	7 (13.0)		27 (8.6)	15 (13.9)		32 (9.6)	10 (11.4)	
Marital status									
Married	329 (89.2)	18 (33.3)	0.001*	10 (3.2)	28 (25.9)	0.001*	13 (3.9)	25 (28.4)	<0.001*
Single	17 (4.6)	15 (27.8)		20 (6.3)	10 (9.3)		22 (6.6)	10 (11.4)	
Divorced	12 (3.3)	12 (22.2)		14 (4.4)	8 (7.4)		20 (6.0)	8 (9.1)	
Widowed	11 (3.0)	9 (16.7)		17 (5.4)	11 (10.2)		7 (2.1)	11 (12.5)	
Education									
None	17 (4.6)	21 (38.9)	0.001*	10 (3.2)	28 (25.9)	0.001*	13 (3.9)	25 (28.4)	<0.001*
Primary	48 (13.0)	9 (16.7)		40 (12.7)	17 (15.7)		38 (11.3)	19 (21.6)	
Secondary	60 (16.3)	11 (20.4)		48 (15.2)	23 (21.3)		50 (14.9)	21 (23.9)	
Tertiary	244 (66.1)	13 (24.1)		217 (68.9)	40 (37.1)		234 (69.9)	23 (26.1)	
Place of residence									
Urban	293 (79.4)	35 (64.8)	0.016*	263 (83.5)	65 (60.2)	<0.001*	269 (80.3)	59 (67.0)	0.008*
Rural	76 (20.6)	19 (35.2)		54 (16.5)	43 (39.8)		66 (19.7)	29 (33.0)	
Occupation									
Unemployed	54 (14.6)	18 (33.3)	0.008*	59 (18.7)	21 (19.4)	0.191	62 (18.5)	11 (12.5)	0.460
Self-employed	88 (23.8)	10 (18.5)		73 (23.3)	15 (13.9)		79 (23.6)	19 (21.6)	
Private employed	82 (22.2)	10 (18.5)		66 (21.0)	23 (21.3)		70 (20.9)	23 (26.1)	
Civil servants	145 (39.3)	16 (29.6)		117 (37.1)	49 (45.4)		124 (37.0)	35 (39.8)	
Religion									
Christianity	334 (90.5)	43 (79.6)	0.016*	248 (78.7)	59 (54.6)	<0.001*	300 (89.6)	77 (87.5)	0.582
Islam	35 (9.5)	11 (20.4)		67 (21.3)	49 (45.4)		35 (10.4)	11 (12.5)	
Gestational age									
1st trimester	40 (10.8)	17 (31.5)	0.001*	38 (12.1)	19 (17)	0.010*	11 (3.3)	46 (52.3)	0.001*
2nd trimester	57 (15.4)	19 (35.2)		46 (17.6)	30 (27.80		52 (15.5)	24 (27.3)	
3rd trimester	272 (73.7)	18 (33.3)		231 (73.3)	59 (54.6)		272 (81.2)	18 (20.4)	

*Statistically significant

Table 4: Determinants of good knowledge, attitude and practice of preventive measures against COVID-19

Variables	Knowledge of COVID-19		Attitude towards COVID-19		Practice of preventive measures	
	Good (n = 369) Poor (n = 54)	p value	Good (n = 315) Poor (n = 108)	p value	Good (n = 335) Poor (n = 88)	p value
Age (years)						
≤ 24	3.842 (1.242 – 6.134)	0.012*			4.325 (2.175 – 8.325)	0.033*
25-29	2.116 (0.876 - 2.131)	0.045*			1.227 (0.936 – 3.764)	0.453
30-34	1.092 (0.622 – 1.987)	0.237			1.179 (0.723 – 1 846)	0.165
≥ 35	1				1	
Parity						
0	1.689 (0.767 – 2.737)	0.487				
1	1.573 (0.687 – 1.958)	0.513				
2-4	1.256 (0.463 - 1.675)	0.134				
≥ 5	1					
Marital status						
Married	4.429 (1.612 – 7.342)	0.025*			6.886 (2.359 – 9.454)	0.010*
Not married	1				1	
Education						
Primary	1		1		1	
Secondary	2.321 (0.835- 4.987)	0.034*	3.048 (1.052- 5.213)	0.021*	2.421 (0.897-4.320)	0.045*
Tertiary	5.324 (1.284-9.213)	0.001*	5.923 (0.973- 8.924)	0.012*	4.326 (1.023-7.745)	0.023*
Place of residence						
Urban	1		1		1	
Rural	3.276 (0.840 – 5.346)	0.008*	2.832 (0.216 – 4.765)	0.025*	3.129 (0.633-6.102)	0.018*
Gestational age						
1st trimester	1		1		1	
2nd trimester	2.783 (1.021- 4.863)	0.041*	3.846 (1.275 – 6.021)	0.042*	3.024 (1.127 - 6.843)	0.033*
3rd trimester	4.272 (1.673-7.252)	0.018*	5.733 (1.786- 9.231)	0.022*	4.985 (0.987- 8.546)	0.011*

*Statistically significant

4. Discussion

COVID-19 is an emerging infectious disease of public health importance [1]. The display of positive attitude and practice of preventive measures towards any disease entity are premised on the level of knowledge and understanding of that disease by the populace [10, 20, 21]. This study evaluated the level of knowledge, attitude and practice of the preventive measures of COVID-19 among pregnant women. Majority (87.2%) of the pregnant women in this study demonstrated good knowledge of COVID-19 and 81.6% identifying virus as the causative agent. This level of knowledge is consistent with previous findings by Anikwe *et al.* [10] (82%) and Zhou *et al.* [22] (89%) from Nigeria and China respectively but higher than the reported figures of 52.1% and 62.7% from Ethiopia and Ghana by Degu *et al.* [23] and Serwaa *et al.* [24] respectively. This high level of knowledge among our pregnant women might be due to the massive and aggressive awareness program embarked on by the Nigerian government at all levels and the various non-governmental organizations to provide adequate information about this disease and the preventive measures through the various media. This was evident in this study as news/social media and health workers were the major sources of information to the participants and this also explained why more than three quarters of the women showed positive attitudes towards the disease ant the various preventive measures against it.

The age of the respondents was positively associated with good knowledge and practice of the preventive measures of COVID-19 in our study. Women of younger age groups had better knowledge about COVID-19 and were more likely to observe the preventive protocols. This is comparable with findings from previous studies done in Ethiopia [23], Nigeria [25] and Egypt [26]. These studies opined that the younger women probably had quick and better access to information on COVID-19 since its outbreak through the news/social media which they use intensively being deeply exposed to them.

Pregnant women with higher education in this study showed higher level of knowledge of COVID-19 with positive attitude towards the disease and were more likely to observe the COVID-19 preventive measures compared with women with low level of education. This finding had been reported earlier by Nwafor *et al.* [19], Degu *et al.* [23], Fikadu *et al.* [27] and Tadese *et al.* [28]. This is because women with higher education have access to information about COVID-19 from various sources and have the ability to comprehend this information. Female education has positive influence on women about being knowledgeable about their reproductive health, improve their decision-making capabilities and engage in beneficial health practices including the preventive measures [29]. Also, good and comprehensive knowledge of the disease might improve their insight and awareness which might to developing good and positive attitude towards COVID-19 as seen among our participants [23].

Women who lived in the urban area had three times the odds of having good knowledge of COVID-19, showing positive attitude towards the disease and observing the preventive measures towards COVID-19. This was similarly reported in studies in Ethiopia [27, 28] and India [30] where urban residency was found to be associated with good knowledge and practice of the preventive measures. This might be because urban residents have better access to various sources of information and even health facilities where they can get hear messages about the corona virus disease pandemic [27, 28]. Also, urban dwellers are more likely to have higher form of education which enhances their access to information on prevailing situations including

corona virus disease [29].

A statistically significant association was observed between gestational age the women were and level of knowledge, attitude and practice of the preventive measures against COVID-19. Our study revealed that women in the late trimester of pregnancy were had good knowledge, positive attitude and practice of the preventive measures against COVID-19. Antenatal clinic utilization and follow up visits provide opportunity for pregnant women to get adequate information and counseling about the disease and the preventive strategies form the health workers through antenatal classes. This would probably increase their level of knowledge of the disease, develop a positive attitude about this and strengthen their compliance to the various preventive measures because studies have shown that increasing antenatal attendance is associated with high level of birth preparedness among pregnant women [31, 32].

This study is a single center and hospital based cross-sectional study involving only the pregnant women attending antenatal care thus limiting the generalization of the results to the entire obstetric population in the study environment and definite cause and effects cannot be inferred. Also social desirability and recall bias may also limit the study.

In conclusion, the findings of this study showed the level of knowledge of the pregnant women studied of COVID-19, their attitude towards the disease and the practice of the preventive measures against the disease have increased tremendously since onset of the pandemic due to the massive campaign by both public and private institutions. Younger age of the women, higher education, being married, urban residency and late trimester of pregnancy significantly influenced the knowledge of the pregnant women, their attitude and practice of the preventive measures. Therefore, efforts to sustain the awareness campaign should be maintained while information, education and communication materials that would further raise the awareness and compliance of these women must be made available at the various antenatal clinics especially in the rural areas with limited access to electronic media. The possibility of a randomized controlled and multicenter study should be considered in future research.

5. Acknowledgement

6. Conflicts of interest

The authors declare that they have no conflicts of interest

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