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Adherence to COVID-19 preventive measures and associated factors among pregnant women in Ghana

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Abstract

OBJECTIVE To assess adherence to COVID-19 preventive measures and its associated factors among pregnant women in Ghana.

METHODS This was a cross-sectional study conducted in the Nabdam district, Ghana. Data were collected from 527 pregnant women randomly selected from antenatal care clinics from 16 healthcare facilities. Descriptive statistics were used to assess the prevalence of adherence to COVID-19 preventive measures. Multivariable logistic regression was used to estimate the factors associated with COVID-19 preventive measures, whilst adjusting for potential confounders.

RESULTS The prevalence of wearing a face mask 18.0% (95% CI: 14.73%, 21.32%); of handwashing/hand sanitising 31.7% (95% CI: 27.70%, 35.67%), and of social distancing, 22.0% (95% CI: 18.46%, 25.56%). Multivariable logistic regression analysis revealed that knowledge of COVID-19 symptoms [Adjusted odds ratios (aOR): 2.86, 95% CI: 1.03, 7.89] and knowledge of COVID-19 transmission via contaminated surfaces/objects (aOR: 4.60, 95% CI: 1.23, 17.18) were associated with wearing a face mask. Pregnant women who knew that avoiding the touching of eyes, nose and mouth can prevent COVID-19 (aOR: 2.71, 95% CI: 1.01, 7.28), and knowledge of the virus being transmitted via contaminated objects/surfaces (aOR: 4.08, 95% CI: 1.42, 11.76), were associated with handwashing/hand sanitising. Knowledge of COVID-19 transmission via contaminated surfaces/objects (aOR: 15.27, 95% CI: 1.87, 124.43) was also associated with social distancing.

CONCLUSION The findings of our study suggest that knowledge of COVID-19 symptoms, transmission and preventive measures may play an important role in the practice of preventive measures against COVID-19 among pregnant women.

keywords COVID-19, face mask, handwashing, social distancing, pregnant women, preventive measures, Ghana

Sustainable Development Goals (SDGs): Good health and well-being; Reduced inequalities; Quality Education; Partnership for the Goals

Introduction

The global Coronavirus Disease 2019 (COVID-19) pandemic has been on the increase since its emergence in Wuhan in December 2019 [1–3]. COVID-19 is an infectious disease which is transmitted via respiratory droplets, contaminated surfaces/objects and aerosols [4–6]. Common symptoms of COVID-19 include fever, dry cough and tiredness [7], which usually present 2–14 days after exposure to the virus [8]. Asymptomatic cases of COVID-19 have also been reported [9]. COVID-19 is associated with morbidity and mortality with currently no definitive treatment [10–12]. The global community has adopted several measures to prevent and control the pandemic including wearing a face mask, handwashing/hand sanitising, social distancing, lockdowns, isolation/quarantine and contact tracing [13, 14].

The COVID-19 pandemic has generated concerns about its impact on pregnancy and child health outcomes. Whilst some studies have suggested that there is no difference in the risk of COVID-19 among pregnant women and the general population [15, 16], others have shown that pregnancy increases the risk of contracting COVID-19 [17, 18]. The risk of COVID-19 increases in pregnancy due to the weakened immune system associated with pregnancy [17]. It has also been reported

that pregnant women experience severe COVID-19 and are more likely to be hospitalised than non-pregnant women [19]. The severe form of COVID-19 among pregnant women is associated with high maternal mortality [20]. Mixed findings have been reported on the possibility of vertical transmission of COVID-19. Whilst Chen et al. reported that intrauterine vertical transmission was unlikely [21], Kimberlin and Stagno raised concerns that vertical transmission might be possible [22]. Pregnancy with COVID-19 is associated with higher incidence of foetal distress, preterm delivery and neonatal complications such as pneumonia and respiratory distress syndrome [23, 24].

The first case of COVID-19 was reported in Ghana on 12 March, 2020 and as of 21 October, 2020, Ghana reported 312 deaths and 47 538 cases [1, 25]. In addition to the recommendations of WHO, Ghana implemented the '3 Ts' (i.e. test, treat and trace) approach and lockdowns in parts of the country to curb the spread of the virus [13, 26, 27]. Since the inception of COVID-19 preventive measures, the level of adherence to these measures has not been reported in Ghana, particularly among pregnant women who are considered vulnerable. This study sought to assess adherence to COVID-19 preventive measures and its associated factors among pregnant women in Nabdam District, Ghana.

Methods

Study design and study population

This was a cross-sectional study conducted in Nabdam District, one of 15 districts in the Upper East Region of Ghana. The study population consisted of pregnant women aged 18 years and older attending antenatal care. Healthcare facilities in the district provide daily antenatal care services and comply with COVID-19 protocols and preventive measures. Handwashing stations with soap and running water are also provided at each clinic.

Data collection and sample size

The inclusion criteria were pregnant women aged 18 years or older attending antenatal care in the facilities. All 16 health facilities with antenatal clinics were purposively sampled in Nabdam District in October 2020. We used antenatal care records from each clinic to come up with a random sample of pregnant women for each clinic. Names of pregnant women from the antennal care records for each clinic were listed in Excel and a random generator was used to select a random sample for each clinic. The random sample of pregnant women recruited from each clinic was proportional to the total number of pregnant women enrolled in each antenatal clinic. Pregnant women who were randomly selected were interviewed at their respective clinics by trained research assistants using their antenatal appointment date in October 2020. Structured questionnaires were administered by trained research assistants. Data collected included participants' socio-demographic and obstetric characteristics; participants' knowledge about COVID-19 common symptoms, transmission and preventive measures; and their practice of COVID-19 preventive measures. We piloted our questionnaire on 15 randomly selected pregnant women in Talensi, a neighbouring district, in order to pretest the sampling procedure and the survey questions.

We used Epi info version 7.1 to estimate the minimum sample size required for the study, based on our assumption that the proportion of pregnant women who practiced COVID-19 preventive measures was 50% in view of no previously reported prevalence of the practice of COVID-19 preventive measures in our study population. Using a 5% margin of error with a 95% confidence interval, a sample size of 370 was required. However, this was increased to 407 to account for a non-response rate of 10%. We approached 556 women, of whom 29 were ineligible. The remaining 527 women participated in the study.

Primary outcomes

We assessed three primary outcomes of interest: wearing a face mask; handwashing with soap and water or hand sanitising with alcohol-based hand sanitiser; and social distancing. We assigned a value of '1' for women who wore a face mask always or often, and '0' for women who reported not wearing the face mask or who wore the face mask sometimes [28]. Handwashing or hand sanitising was also dichotomised as '1' for women who always or often washed their hands with soap and water or sanitised their hands with alcohol-based hand sanitiser and '0' for women who reported not practicing handwashing/hand sanitising or sometimes handwashed/hand sanitised [28]. We defined social distancing by assigning a value of '1' for a woman who always or often maintained a distance of at least one metre between her and others, '0' for a woman who did not practice social distancing or practiced it sometimes [29].

Independent variables

Our independent variables of interest were assessed on participants' knowledge of COVID-19 symptoms and

mode of transmission of COVID-19, and participants' knowledge of COVID-19 preventive measures. Independent variables included pregnant women who were knowledgeable that COVID-19 can present with symptoms such as fever, tiredness, dry cough and dyspnea (yes, no); women who reported that COVID-19 can be transmitted through respiratory droplets from an infected person (yes, no); and women who reported that COVID-19 can be transmitted by touching surfaces or objects contaminated with the virus (yes, no). Other independent variables were women who reported that avoiding the touching of the eyes, nose and mouth can prevent COVID-19 infection (yes, no), and women who reported that avoiding crowded places can prevent COVID-19 infection (yes, no).

Covariates

The covariates were as follows: age (continuous measure); marital status (married, single), educational level of women (no formal education, primary, secondary/tertiary); place of residence (rural, urban); parity (nulliparous, primiparous, multiparous); gestational age (0–13, 14–26, 27–40 weeks); antenatal care attendance (1–3 visits, ≥ 4 visits); and received education on COVID-19 at a healthcare facility (yes, no).

Data analysis

Data on socio-demographic and obstetric characteristics were reported using descriptive statistics. We conducted three separate multivariable logistic regression analysis to assess the relationship between our independent variables of interest and each of our primary outcomes, whilst controlling for covariates. We adjusted for covariates in each model as we believe there is a biological plausibility that they might confound the relationship between our independent variables of interest and outcome variables. Multicollinearity for each of the models was tested using pairwise correlation matrix, variance inflation factor and tolerance, and eigensystem analysis of correlation matrix [30], to ensure that there were no issues on multicollinearity. The fitness of each model was assessed using the global null hypothesis test. Data analysis was conducted using SAS version 9.3 (SAS Institute, Cary, NC).

Ethical consideration

The study protocol was approved by the School of Medical Sciences/Komfo Anokye Teaching Hospital Committee on Human Research, Publication and Ethics. Informed consent was also obtained from all pregnant women.

Results

Socio-demographic and obstetric characteristics, and prevalence of COVID-19 preventive measures

The study sample consisted of 527 pregnant women aged 18 years and older, with a mean age of 26 ± 5.9 years. Approximately, 84.6% were married, 46.9% had a primary level of education, and 44% were multiparous (Table 1).

An estimated 18.0% (95% CI: 14.73%, 21.32%) of women wore a face mask always or often. The proportion of women who practiced handwashing or sanitised their hands with alcohol-based sanitisers was 31.7% (95% CI: 27.70%, 35.67%), whilst 22.0% (95% CI: 18.46%, 25.56%) practiced social distancing always/often (Figure 1).

Factors associated with adherence to COVID-19 preventive measures

Every 1 unit increase in age was associated with an 8% increase in odds of wearing a face mask [Adjusted odds

Table 1 Socio-demographic and obstetric characteristics (n = 527)

Variable	N (%) or Mean (SD)
Age (years)	26 (5.9)
Marital status	
Single	81 (15.4)
Married	446 (84.6)
Education	
No formal education	119 (22.6)
Primary	247 (46.9)
Secondary/Tertiary	161 (30.6)
Received education on COVID-19 at a healthcare facility	
No	179 (34.4)
Yes	341 (65.6)
Place of residence	
Rural	306 (58.1)
Urban	221 (41.9)
Gestational age	
0–13 weeks	128 (24.3)
14–26 weeks	216 (41)
27–40 weeks	183 (34.7)
Parity	
Nulliparous	168 (31.9)
Primiparous	127 (24.1)
Multiparous	232 (44.0)
Antenatal care attendance	
1–3 visits	241 (45.8)
≥4 visits	285 (54.2)

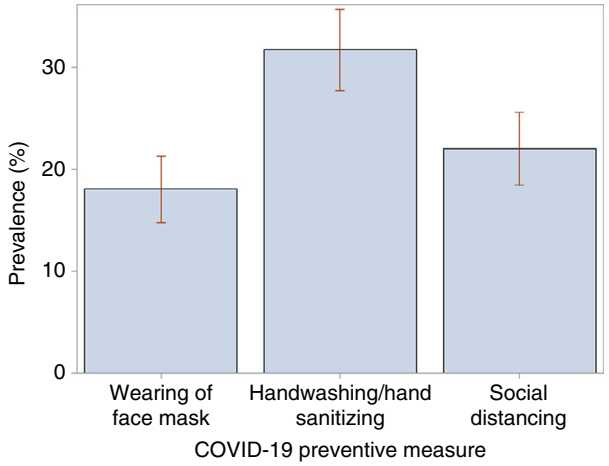

Figure 1 Bar plot on the prevalence of the practice of COVID-9 preventive measures among pregnant women in Ghana. [Colour figure can be viewed at wileyonlinelibrary.com]

ratio (aOR):1.08, 95% CI: 1.01, 1.17]. The odds of wearing a face mask among women who had a secondary or tertiary level of education was 3.28 times the odds of wearing a face mask among women who had no formal education (aOR: 3.28, 95% CI: 1.22, 8.82). The odds of wearing a face mask among women who received education on COVID-19 at a health facility were 92% higher than among women who did not (aOR: 1.92, 95% CI: 1.01, 3.62). The odds of wearing a face mask among women who were knowledgeable of COVID-19 symptoms were 2.86 times the odds of wearing a face mask among women who were not knowledgeable (aOR: 2.86, 95% CI: 1.03, 7.89). Women who reported that COVID-19 can be transmitted by touching surfaces or objects contaminated with the virus had 4.6 times the odds of wearing a face mask as women who reported otherwise (aOR: 4.60, 95% CI: 1.23, 17.18) (Table 2).

There was a 10% increase in odds of practicing handwashing or hand sanitising for every 1 unit increase in age of a woman (aOR: 1.10, 95% CI: 1.03, 1.16). The odds of handwashing or hand sanitising among women who had a secondary or tertiary level of education were five times the odds of practicing handwashing or hand sanitising among women who had no formal education (aOR: 5.04, 95% CI: 2.42, 10.50). Women who reported that COVID-19 can be transmitted by touching surfaces or objects contaminated with the virus had four times the odds of practicing handwashing or hand sanitising as women who reported otherwise (aOR: 4.08, 95% CI: 1.42, 11.76). Women who reported that avoiding the touching of eyes, nose and mouth can prevent COVID-19 infection had 2.71 times the odds of practicing handwashing or hand sanitising as women who did not report this (aOR: 2.71, 95% CI: 1.01, 7.28) (Table 3).

The odds of practicing social distancing increased by 10% for every 1 unit increase in age (aOR: 1.10, 95% CI: 1.03, 1.17). The practice of social distancing was 2.89 times among women with secondary or tertiary

Table 2 Factors associated with wearing a face mask (n = 527)

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age (years)	1.04 (1.01, 1.07)	1.08 (1.01, 1.17)*
Marital status		
Single	1	1
Married	0.80 (0.44, 1.44)	0.83 (0.40, 1.74)
Education		
No formal education	1	1
Primary	0.72 (0.34, 1.51)	0.65 (0.24, 1.71)
Secondary/ Tertiary	5.11 (2.64, 9.89)	3.28 (1.22, 8.82)*
Received education on COVID-19 at a healthcare facility		
No	1	1
Yes	2.24 (1.32, 3.82)	1.92 (1.01, 3.62)*
Place of residence		
Rural	1	1
Urban	2.45 (1.55, 3.87)	1.40 (0.78, 2.52)
Gestational age		
0–13 weeks	1	1
14–26 weeks	1.15 (0.64, 2.09)	0.80 (0.35, 1.82)
27–40 weeks	1.37 (0.75, 2.50)	0.60 (0.20, 1.75)
Parity		
Nulliparous	1	1
Primiparous	1.37 (0.77, 2.41)	1.32 (0.63, 2.74)
Multiparous	0.76 (0.44, 1.30)	0.92 (0.32, 2.71)
Antenatal care attendance		
1–3 visits	1	1
≥ 4 visits	1.96 (1.23, 3.14)	2.24 (0.95, 5.29)
Can COVID-19 present with symptoms such as fever, tiredness, dry cough and dyspnea		
No	1	1
Yes	4.40 (1.56, 12.42)	2.86 (1.03, 7.89)*
Can COVID-19 be transmitted via respiratory droplets		
No	1	1
Yes	5.29 (0.70, 39.97)	2.58 (0.47, 14.19)
Can COVID-19 be transmitted by touching surfaces/objects contaminated with the virus		
No	1	1
Yes	12.76 (3.07, 53.06)	4.60 (1.23, 17.18)*
Avoiding the touching of eyes, nose and mouth can prevent COVID-19 infection		
No	1	1
Yes	13.29 (3.2, 55.24)	4.21 (0.95, 18.72)
Avoiding crowded places can prevent COVID-19 infection		
No	1	1
Yes	21.35 (2.91, 156.61)	3.98 (0.55, 29.03)

* = Significant at P-value < 0.05; 1 = Reference category.

Table 3 Factors associated with handwashing/hand sanitising (n = 527)

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age (years)	1.01 (0.98, 1.04)	1.10 (1.03, 1.16)*
Marital status		
Single	1	1
Married	0.67 (0.41, 1.09)	0.85 (0.46, 1.57)
Education		
No formal education	1	1
Primary	1.51 (0.85, 2.69)	1.58 (0.77, 3.25)
Secondary/ Tertiary	7.2 (4.01, 12.92)	5.04 (2.42, 10.50)*
Received education on COVID-19 at a healthcare facility		
No	1	1
Yes	1.44 (0.97, 2.16)	1.17 (0.72, 1.89)
Place of residence		
Rural	1	1
Urban	2.45 (1.68, 3.57)	1.43 (0.91, 2.24)
Gestational age		
0–13 weeks	1	1
14–26 weeks	1.04 (0.65, 1.66)	0.88 (0.47, 1.65)
27–40 weeks	0.91 (0.56, 1.49)	0.55 (0.25, 1.21)
Parity		
Nulliparous	1	1
Primiparous	0.89 (0.55, 1.44)	0.78 (0.43, 1.40)
Multiparous	0.54 (0.35, 0.84)	0.56 (0.25, 1.24)
Antenatal care attendance		
1–3 visits	1	1
≥4 visits	1.20 (0.83, 1.74)	1.49 (0.79, 2.80)
Can COVID-19 present with symptoms such as fever, tiredness, dry cough and dyspnea		
No	1	1
Yes	3.01 (1.54, 5.89)	2.09 (0.95, 4.58)
Can COVID-19 be transmitted via respiratory droplets		
No	1	1
Yes	1.41 (0.55, 3.64)	0.45 (0.11, 1.75)
Can COVID-19 be transmitted by touching surfaces/objects contaminated with the virus		
No	1	1
Yes	6.33 (2.98, 13.45)	4.08 (1.42, 11.76)*
Avoiding the touching of eyes, nose and mouth can prevent COVID-19 infection		
No	1	1
Yes	6.63 (3.12, 14.06)	2.71 (1.01, 7.28)*
Avoiding crowded places can prevent COVID-19 infection		
No	1	1
Yes	5.06 (2.37, 10.79)	1.02 (0.33, 3.19)

* = Significant at P-value < 0.05; 1 = Reference category.

Table 4 Factors associated with social distancing (n = 527)

Variable	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age (years)	1.02 (0.99, 1.06)	1.10 (1.03, 1.17)*
Marital status		
Single	1	1
Married	1.17 (0.65, 2.12)	1.58 (0.77, 3.25)
Education		
No formal education	1	1
Primary	1.41 (0.73, 2.71)	1.43 (0.64, 3.2)
Secondary/ Tertiary	4.82 (2.53, 9.19)	2.89 (1.26, 6.65)*
Received education on COVID-19at a healthcare facility		
No	1	1
Yes	1.88 (1.17, 3.01)	1.6 (0.93, 2.75)
Place of residence		
Rural	1	1
Urban	3.49 (2.26, 5.38)	2.39 (1.46, 3.93)*
Gestational age		
0–13 weeks	1	1
14–26 weeks	1.30 (0.75, 2.28)	1.41 (0.73, 2.73)
27–40 weeks	1.49 (0.85, 2.62)	1.28 (0.54, 3.02)
Parity		
Nulliparous	1	1
Primiparous	0.94 (0.55, 1.6)	0.75 (0.38, 1.45)
Multiparous	0.64 (0.4, 1.04)	0.57 (0.24, 1.38)
Antenatal care attendance		
1–3 visits	1	1
≥4 visits	1.42 (0.93, 2.17)	1.05 (0.53, 2.08)
Can COVID-19 present with symptoms such as fever, tiredness, dry cough and dyspnea		
No	1	1
Yes	3.03 (1.35, 6.82)	2.04 (0.84, 5.00)
Can COVID-19 be transmitted via respiratory droplets		
No	1	1
Yes	1.43 (0.48, 4.29)	0.57 (0.15, 2.19)
Can COVID-19 be transmitted by touching surfaces/objects contaminated with the virus		
No	1	1
Yes	34.10 (4.66, 249.52)	15.27 (1.87, 124.43)*
Avoiding the touching of eyes, nose and mouth can prevent COVID-19 infection		
No	1	1
Yes	8.30 (2.97, 23.19)	2.24 (0.75, 6.71)
Avoiding crowded places can prevent COVID-19 infection		
No	1	1
Yes	13.56 (3.26, 56.41)	2.51 (0.66, 9.60)

* = Significant at P-value < 0.05; 1 = Reference category.

education compared to women with no formal education (aOR: 2.89, 95% CI: 1.26, 6.65). Women living in urban areas had 2.39 times the odds of practicing social distancing compared to women living in rural areas (aOR: 2.39, 95% CI: 1.46, 3.93). Women who reported that COVID-19 can be transmitted by touching surfaces or objects contaminated with the virus had 15.27 times the odds of practicing social distancing compared to women who reported otherwise (aOR:15.27, 95% CI: 1.87, 124.43) (Table 4).

Discussion

Our analysis revealed poor compliance with COVID-19 preventive measures among pregnant women: only 18.0% wore a face mask, 31.7% practiced handwashing/ hand sanitising and 22% practiced social distancing. This may be the result of poor understanding about COVID-19, failure to educate pregnant women on the part of health facilities or unawareness of the Government of Ghana's directives [26, 31]. The poor compliance with COVID-19 preventive measures in our study is alarming, as it puts pregnant women and healthcare staff at risk of being exposed to COVID-19, and women infected with COVID-19 may suffer adverse pregnancy incomes [32, 33].

Our finding that pregnant women with tertiary or secondary level of education are more likely to wear a face mask, practice handwashing/hand sanitising and social distancing compared to women who had no formal education is not surprising. Educated women are more likely to access information on COVID-19 and comprehend the various messages being disseminated on COVID-19 by the Government of Ghana and non-governmental organisations and more likely to understand their importance.

In this study, pregnant women who reported that COVID-19 can be transmitted via surfaces or objects contaminated with the virus were more likely to wear a face mask, practice handwashing/hand sanitising and social distancing than women who did not know this transmission route. This finding might be due to precautionary measures taken by pregnant women to avoid exposure to the virus. Handwashing/hand sanitising prevents individuals from the virus should their hands come into contact with contaminated surfaces [34, 35], whilst wearing a face mask is associated with reduced touching of eyes, nose and mouth, which prevents individuals from getting infected should their hands get contaminated with the virus [36–38].

The observation made in our study that pregnant women who received education on COVID-19 at a healthcare facility were more likely to wear a face mask than women who did not, emphasises the important role healthcare workers play in disseminating public health messages. It also might reflect the trust clients have in health information provided by healthcare facilities. Pregnant women who knew about COVID-19 symptoms were more likely to wear a face mask than pregnant women who did not, perhaps because they are more likely to know about COVID-19 transmission and preventive measures.

Pregnant women who reported that avoiding the touching of the eyes, nose and mouth can prevent COVID-19 had higher odds of handwashing/ hand sanitising than women who reported otherwise. As face touching is a frequent habit [39], this finding is expected as handwashing /hand sanitising is a precautionary measure taken to prevent infection with COVID-19 via the eyes, nose and mouth if a person's hands get contaminated with the virus [40].

Pregnant women living in urban areas were more likely to practice social distancing than their peers in rural areas, perhaps because urban areas are more densely populated, making social distancing more likely. It is also easier for women in urban areas to access information about COVID-19 preventive measures [41], and urban women are more likely to have at least secondary level of education [42, 43].

Increasing age was associated with higher prevalence of wearing a face mask, handwashing/hand sanitising and social distancing. An increase in the risk of COVID-19 disease severity has been widely reported among older vs. younger patients [44, 45]. Our finding may be a reflection that older women are more health conscious and adhering to precautions against COVID-19 than young women.

This study had some limitations. The primary outcomes were self-reported, and subject to recall bias. We expect recall bias to be similar between women who reported knowledge of any of our independent variables of interest and those who did not. The true prevalence of our primary outcomes in our study is likely to be overestimated as women might be aware of the directive by the Government of Ghana to observe COVID-19 preventive measures. Another limitation is that social distancing was not objectively measured and might be subject to measurement error. Antenatal clinics and Nabdam District were purposively sampled, and therefore our findings may not be generalisable to other districts within the region. However, our findings fill an important gap in literature on factors associated with adherence to practice of COVID-19 preventive measures among pregnant women.

Conclusion

Improving the knowledge of pregnant women on COVID-19 symptoms, transmission and preventive measures is essential in promoting the practice of preventive measures against COVID-19. The findings also suggest that healthcare facilities may not be involved in educating pregnant women on COVID-19 and its associated

preventive measures. Our findings may also be relevant for low-and middle-income countries interested in increasing the coverage of the practice of COVID-19 preventive measures among pregnant women.

Data availability statement

The data are available upon request.

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