

Gender and Age as Predictors of COVID-19 Vaccine Hesitancy among Secondary School Teachers in North-East Senatorial District of Benue State: A Cross-Sectional Study

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Abstract

This study investigated gender and age as predictors of COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State. A descriptive cross-sectional design was used. A sample size of 674 was selected from a population of 6,962 secondary school teachers in the North-East Senatorial District using proportionate stratified and simple random sampling techniques. A face-validated 28-item researcher-developed instrument titled “COVID-19 Vaccine Hesitancy Questionnaire (COV-19VHQ)” was used for data collection. Frequencies and percentages were used to describe the sociodemographic characteristics of the respondents and to answer the research questions, while binary logistic regression was used to test the null hypotheses at 0.05 alpha level. The results showed that most of the teachers (89.5%) were not vaccinated against COVID-19, and majority (70.5%) were COVID-19 vaccine hesitant. The results of binary logistic regression analysis showed that gender did not significantly predict COVID-19 vaccine hesitancy (OR = 1.034, $p = .885$, 95% CI = 0.660 - 1.618). The results, however, showed that age significantly predicted COVID-19 vaccine hesitancy (OR = 0.009, $p < .001$, 95% CI = 0.003 - 0.025) as the participants of younger age were more likely to be hesitant than participants aged 50 years or above. The authors therefore, recommended that the Government of Benue State should make COVID-19 vaccination a condition for teaching in all schools in the state, and the intervention efforts in curbing COVID-19 vaccine hesitancy should specifically target teachers of younger age.

Keywords: COVID-19, Vaccine hesitancy, Gender, Age

Introduction

Coronavirus disease, 2019 (COVID-19) is a deadly infectious disease that is caused by severe acute respiratory syndrome coronavirus 2 (SARS-COV-2). Severe acute respiratory syndrome coronavirus 2 is a virus that attacks and damages the lungs and other vital organs resulting in respiratory difficulty and or death. Since the outbreak of COVID-19 in Wuhan City, China, the search for a vaccine to curb the spread of the disease began. It was not until December 2020 that Pfizer-BioNTech (a pharmaceutical and biotechnological company based in the US) first announced the discovery of COVID-19 vaccine with 95% efficacy. Since then, various COVID-19 vaccines, including Pfizer-BioNTech, Moderna, AstraZeneca, Johnson & Johnson, and Sinopharm, have received approval from the World Health Organization and have been distributed to many countries of the world to fight the COVID-19 pandemic. Despite the desperate need for interventions from vaccines, there is still considerable hesitancy regarding acceptance and use of the available COVID-19 vaccines in many countries in Africa (Tulloch et al., 2021).

According to the World Health Organization (2020), vaccine hesitancy is the delay in acceptance, reluctance, unwillingness, or refusal to take vaccination despite the availability of

the vaccination services. In Nigeria, the vaccination data as at the time of this research showed that out of the 6.2 million doses of vaccines supplied to Nigeria, only 1.78 million doses have been utilized (representing 0.9% of the population fully vaccinated) while countries such as Spain, Canada, United Arab Emirates, Portugal, and Singapore have vaccinated 77.3%, 70.8%, 83.0%, 83.6% and 80.0% of their populations respectively (Richie et al., 2021).

Studies have shown that socio-demographic factors such as gender, age, educational level, religion, and location could influence COVID-19 vaccine uptake (Amuzie et al., 2021; Danabal et al., 2021; Kose et al., 2021; Okubo et al., 2022; Zwawua & Kor, 2023).

Gender has been shown to have influence on vaccine acceptance. For instance, Mohan et al. (2021) observed that women are more likely to express a desire to delay or reject vaccination than men. The authors further stated that women are more likely than men to entertain fears of side effects of vaccines especially new ones, and more likely to adhere to philosophical or religious beliefs that prohibit vaccination. In New York City, Banach et al. (2012) reported that women were twice as likely to refuse vaccination as compared to men. Nery et al. (2022) also observed that women were more likely to express a desire to delay or to reject vaccination than men.

Age is a factor that may influence health-related behaviour including vaccine hesitancy (Siegrist et al., 2005). Danabal et al. (2021) observed that persons aged 45 years and above are more likely to accept vaccination because they are considered more susceptible to COVID-19 infection and death. Therefore, the fear of the disease is more in this age category leading to a more favourable attitude towards COVID-19 vaccines than in a younger age category. Petravić et al. (2021) also noted that older people have more trust in vaccines and more positive attitudes towards vaccination based on previous vaccine-related experiences. In most cases, younger people tend to believe more in natural immunity against diseases. Most times, young people believe in other substances more than vaccines for their protection. For instance, Magadmi (2021) observed that young people are more likely to believe in the efficacy of alcoholic gins to protect them against COVID-19 infection more than older persons. Bono et al. (2021) also observed that younger persons are more likely than older persons to hold inaccurate beliefs about COVID-19 vaccines. This is because, the younger age group is more exposed to the vaccine-related misinformation through social media.

Secondary school teachers constitute a population that need COVID-19 vaccination just like the frontline healthcare workers considering their daily interaction with students, parents/guardians and other school personnel. A survey by the United Nations Educational, Scientific and Cultural Organization (UNESCO, 2022) showed that high proportions of teachers had received vaccination against COVID-19 in countries such as Portugal (100%), Chile (98%), Sweden (97%) and Saudi Arabia (96%). Nguyen et al. (2023) reported low prevalence of COVID-19 vaccine hesitancy at 5% among secondary school teachers in New Jersey, Chen et al. (2022) also reported the prevalence of COVID-19 vaccine hesitancy at 31.7% among teachers in a college at Taizhou, China.

In Nigeria, there is dearth of empirical evidence regarding COVID-19 vaccine hesitancy among secondary school teachers. Most of the studies on COVID-19 vaccine hesitancy in Nigeria were conducted among healthcare workers (Amuzie et al., 2021; Iliyasu et al., 2022; Nomhwange et al., 2022). A few studies in Nigeria investigated the psycho-social determinants of COVID-19 vaccine acceptance among secondary school teachers (Masud & Musa, 2021; Udoh, 2022). The fight against COVID-19 may not be successful if the teachers are not willing to take COVID-19 jab. To the best of the researchers' knowledge, none of the published studies has investigated gender and age as predictors of COVID-19 vaccine hesitancy among secondary school teachers in Benue State. To address this gap, this study

investigated gender and age as predictors of COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District, Benue State.

Objectives of the Study

The study sought to determine the:

1. COVID-19 vaccination status of secondary school teachers in North-East Senatorial District of Benue State;
2. proportion of secondary school teachers that exhibit COVID-19 vaccine hesitancy in North-East Senatorial District of Benue State;
3. relationship between gender and COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State; and
4. relationship between age and COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State..

Research Questions

1. What is the COVID-19 vaccination status of secondary school teachers in North-East Senatorial District of Benue State?
2. What is the proportion of secondary school teachers that exhibit COVID-19 vaccine hesitancy in North-East Senatorial District of Benue State?
3. What is the relationship between gender and COVID-19 vaccine hesitancy among secondary school teachers North-East Senatorial District of Benue State?
4. What is the relationship between age and COVID-19 vaccine hesitancy among secondary school teachers North-East Senatorial District of Benue State?

Hypotheses

1. There is no significant association between gender and COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State.
2. There is no significant association between age and COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State.

Methods

The study used the descriptive cross-sectional survey design. The population of secondary school teachers in the study area as at the time of this study was 6962 (Benue State Ministry of Education website: <https://www.moe.be.gov.ng/schools/Index/zone%20B?page>). A sample of 674 secondary school teachers was selected based on 10% of the population in accordance with the recommended sample size by Conroy (2018). The study adopted proportionate stratified and simple random sampling techniques. In the first stage, proportionate stratified sampling was applied (see Appendix A). This was done to reflect the distribution of population of secondary school teachers across the Local Government Areas. In the second stage, simple random sampling of balloting without replacement was applied using lottery. By this method, each teacher in the selected school was assigned a number after which numbers were selected at random.

The instrument used for data collection was a 28-item researcher-made questionnaire titled “Secondary School Teachers’ COVID-19 Vaccine Hesitancy Questionnaire (COV-19VHQ)”. The questionnaire items were sourced from literature (Freeman et al., 2022; Masud & Musa, 2021; Noronha et al., 2021). The COV-19VHQ was divided into three parts: A, B and C. Part ‘A’ which comprised two (2) items obtained information on the demographic characteristics of respondents including gender and age. Part ‘B’ had only one (1) item (what is your COVID-19 vaccination status?) with “vaccinated or not vaccinated” response format. The question is aimed at determining the vaccination status of the participants. Those who indicated that they had received vaccination against COVID-19 were asked to discontinue completing the questionnaire since the next items were on vaccine

hesitancy. The next nine (9) items in Part ‘C’ measured COVID-19 vaccine hesitancy using a binary response of “Agree or Disagree”. Since all the questionnaire items were positively worded, choosing “disagree” on any item indicated COVID-19 vaccine hesitancy. The questionnaire was validated by five experts: three in public health education, two in test and measurement and one in psychology. A reliability test yielded a high Cronbach alpha correlation coefficient of 0.92 indicating good internal consistency for the questionnaire.

Descriptive statistics (frequencies and percentages) were used to describe the demographic data of the respondents. Frequencies and Percentages were also used to answer the question on COVID-19 vaccination status. The proportion of COVID-19 vaccine hesitancy was determined by computing the percentage of “disagree” response for each of the 10 items on vaccine hesitancy. The cluster of the percentages provided the proportion of COVID-19 vaccine hesitancy (Nguyen et al., 2022). For hypotheses testing, binary logistic regression was performed to determine the association between gender, age and COVID-19 vaccine hesitancy. Using odds ratios (ORs), a significant association was declared if $P < .05$ at 95% confidence interval (CI). All these statistics were done using Statistical Package for Social Sciences (SPSS) version 27.

Results

Table 1

COVID-19 Vaccination Status of Secondary School Teachers in North-East Senatorial District of Benue State (n = 674)

Vaccination Status	Frequency	Percentage
Not Vaccinated	603	89.5
Vaccinated	71	10.5

Table 1 shows that out of the 674 teachers that participated in this study, 603 (89.5%) constituting the majority had not received vaccination against COVID-19. Only 71 (10.5%) had received vaccination against COVID-19. The 71 participants were, therefore, excluded from further analysis because there was no need for them to respond to questions on COVID-19 vaccine hesitancy.

Table 2**Proportion of COVID-19 Vaccine Hesitancy among Secondary School Teachers (n = 603)**

Statement	Disagree	Agree
	n (%)	n (%)
If COVID-19 vaccines are made available, I will accept to be vaccinated	418 (69.3)	185 (30.7)
Getting vaccinated is a good way to protect myself against COVID-19	456 (75.6)	147 (24.4)
I am not against uptake of COVID-19 vaccines	417 (69.2)	186 (30.8)
I need COVID-19 vaccine for the protection of other people in my community	417 (69.2)	186 (30.8)
The vaccine is valuable to me because it will lower my risk of contracting COVID-19	413 (68.5)	190 (31.5)
I am not bothered by what people say about the side effects of COVID-19 vaccines	415 (68.8)	188 (31.2)
I prefer receiving COVID-19 vaccination to adopting other preventive measures	412 (68.3)	191 (31.7)
I have absolute trust in COVID-19 vaccines	419 (69.5)	184 (30.5)
I will advise people to accept COVID-19 vaccination	465 (77.1)	138 (22.9)
I can sacrifice my time and visit a vaccination centre for a COVID-19 jab	413 (68.5)	190 (31.5)
Cluster	425 (70.5)	178 (29.5)

n = frequency, % = percentage

Table 2 shows that the proportion of teachers with COVID-19 vaccine hesitancy was 70.5%. The breakdown shows that majority of the respondents 418 (69.3%) disagreed that “If COVID-19 vaccines are made available, I will accept to be vaccinated”, 456 (75.6%) also disagreed that getting vaccinated was a good way to protect themselves against COVID-19. On the statement “I am not against uptake of COVID-19 vaccines”, most of the respondents 417 (69.2%) disagreed. Most of the respondents 417 (69.2%) also disagreed that they needed COVID-19 vaccination to protect other people in their communities. On the statement “the vaccine is valuable to me because it will lower my risk of contracting COVID-19”, most of the respondents 413 (68.5%) disagreed. Majority of the respondents 415 (68.8%) disagreed with the statement “I am not bothered by what people say about the side effects of COVID-19 vaccines”. On the statement “I prefer receiving COVID-19 vaccination to adopting other preventive measures”, 412 (68.3%) disagreed. The Table also shows that 419 (69.5%) representing majority of the respondents disagreed that they had absolute trust in COVID-19 vaccines. Majority of the respondents 465 (77.1%) disagreed that they would advise people to accept COVID-19 vaccination, 413 (68.5%) representing majority of the respondents

disagreed that they would sacrifice their time to visit a vaccination centre for a COVID-19 jab. These results imply that COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State was high.

Table 3
Gender Difference in COVID-19 Vaccine Hesitancy among Secondary School Teachers

Statement	Female (n = 122)		Male (n = 481)	
	Disagree n (%)	Agree n (%)	Disagree n (%)	Agree n (%)
If COVID-19 vaccines are made available, I will accept to be vaccinated	83 (68.0)	39 (32.0)	335 (69.6)	146 (30.4)
Getting vaccinated is a good way to protect myself against COVID-19	94 (77.0)	28 (23.0)	362 (75.3)	119 (24.7)
I am not against uptake of COVID-19 vaccines	82 (67.2)	40 (32.8)	335 (69.6)	146 (30.4)
I need COVID-19 vaccine for the protection of other people in my community	84 (68.9)	38 (31.1)	333 (69.2)	148 (30.8)
The vaccine is valuable to me because it will lower my risk of contracting COVID-19	83 (68.0)	39 (32.0)	330 (68.6)	151 (31.4)
I am not bothered by what people say about the side effects of COVID-19 vaccines	83 (68.0)	39 (32.0)	332 (69.0)	149 (31.0)
I prefer receiving COVID-19 vaccination to adopting other preventive measures	82 (67.2)	40 (32.8)	330 (68.6)	151 (31.4)
I have absolute trust in COVID-19 vaccines	84 (68.9)	38 (31.1)	335 (69.6)	146 (30.4)
I will advise people to accept COVID-19 vaccination	96 (78.7)	26 (21.3)	369 (76.7)	112 (23.3)
I can sacrifice my time and visit a vaccination centre for a COVID-19 jab	80 (65.6)	42 (34.4)	333 (69.2)	148 (30.8)
Cluster	85 (69.7)	37 (30.3)	339 (70.5)	142 (29.5)

n = frequency, % = percentage

Table 3 shows the gender difference in the proportion of COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State. The Table indicates that the proportion of male secondary school teachers who exhibited COVID-19 vaccine hesitancy was 70.5% while that of females was 69.7%. This means that more male teachers than female teachers exhibited COVID-19 vaccine hesitancy.

Table 4
Proportion of COVID-19 Vaccine Hesitancy Based on the Age Range of Respondents

Statement	20 – 29 yrs (n=131)		30 – 39 yrs (n=227)		40 – 49 yrs (n=167)		50 yrs & above (n=78)	
	Disagree n (%)	Agree n (%)	Disagree n (%)	Agree n (%)	Disagree n (%)	Agree n (%)	Disagree n (%)	Agree n (%)
If COVID-19 vaccines are made available, I will accept to be vaccinated	123 (93.9)	8 (6.1)	214 (94.3)	13 (5.7)	70 (41.9)	97 (58.1)	11 (14.1)	67 (85.9)
Getting vaccinated is a good way to protect myself against COVID-19	116 (88.5)	15 (11.5)	189 (83.3)	38 (16.7)	117 (70.1)	50 (29.9)	34 (43.6)	44 (56.4)
I am not against uptake of COVID-19 vaccines	123 (93.9)	8 (6.1)	214 (94.3)	13 (5.7)	69 (41.3)	98 (58.7)	11 (14.1)	67 (85.9)
I need COVID-19 vaccine for the protection of other people in my community	123 (93.9)	8 (6.1)	218 (96.0)	9 (4.0)	68 (40.7)	99 (59.3)	8 (10.3)	70 (89.7)
The vaccine is valuable to me because it will lower my risk of contracting COVID-19	122 (93.1)	9 (6.9)	221 (97.4)	6 (2.6)	64 (38.3)	103 (61.7)	6 (7.7)	72 (92.3)
I am not bothered by what people say about the side effects of COVID-19 vaccines	122 (93.1)	9 (6.9)	222 (97.8)	5 (2.2)	64 (38.3)	103 (61.7)	7 (9.0)	71 (91.0)
I prefer receiving COVID-19 vaccination to adopting other preventive measures	122 (93.1)	9 (6.9)	221 (97.4)	6 (2.6)	62 (37.1)	105 (62.9)	7 (9.0)	71 (91.0)
I have absolute trust in COVID-19 vaccines	123 (93.9)	8 (6.1)	214 (94.3)	13 (5.7)	71 (42.5)	96 (57.5)	11 (14.1)	67 (85.9)
I will advise people to accept COVID-19 vaccination	117 (89.3)	14 (10.7)	188 (82.8)	39 (17.2)	122 (73.1)	45 (26.9)	38 (48.7)	40 (51.3)
I can sacrifice my time and visit a vaccination centre for a COVID-19 jab	123 (93.9)	8 (6.1)	209 (92.1)	18 (7.9)	69 (41.3)	98 (58.7)	12 (15.4)	66 (84.6)
Cluster	121 (93.0)	10 (7.0)	211 (92.4)	16 (7.6)	78 (46.7)	89 (53.3)	15 (19.2)	63 (80.8)

n = frequency, % = percentage

Table 4 shows the age differences in the proportion of COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District. The Table indicates that the proportions of teachers who exhibited COVID-19 vaccine hesitancy based on age were 93.0%, 92.4%, 46.7% and 19.2% for teachers aged 20 – 29 years, 30 – 39 years, 40 – 49 years and 50 years and above, respectively. This means that younger teachers exhibited COVID-19 vaccine hesitancy more than the older teachers.

Table 5

Binary Logistic Regression Analysis on the Association between Gender, Age and COVID-19 Vaccine Hesitancy among Secondary School Teachers

Factor	Odds ratio (OR)	95% Confidence interval (CI) for		p-value
		Lower	Upper	
Gender				
Female	1.034	0.660	1.618	.885
Male (ref.)				
Age Range				
20 – 29 years	0.009*	0.003	0.025	< .001
30 – 39 years	0.003*	0.001	0.011	< .001
40 – 49 years	0.224*	0.127	0.468	< .001
50 years & above (ref.)				

*Significant at $p \leq .05$

Table 5 shows that the odds of acceptance were not significant (OR = 1.034, $p = .885$, 95% CI = 0.660 - 1.618) on gender (male and female). This result indicates that there was no significant association between gender and COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State, thus the null hypothesis was retained.

The Table further shows that participants aged 20 – 29 years (OR = 0.009, $p < .001$, 95% CI = 0.003 - 0.025), aged 30 – 39 years (OR = 0.003, $p < .001$, 95% CI = 0.001 - 0.011), and aged 40 – 49 years (OR = 0.224, $p < .001$, 95% CI = 0.127 - 0.468) were significantly less likely to get vaccinated against COVID-19 than those participants aged 50 years and above. The result indicates a significant association between age and COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State, thus the null hypothesis was rejected.

Discussion

The COVID-19 vaccination status of secondary school teachers in North-East Senatorial District of Benue State as found in this study was not encouraging. Only 10.5% of the teachers reported to have received vaccination against COVID-19. This finding could be attributed to the optional taking of COVID-19 vaccines in Nigeria and the unfounded and discouraging beliefs about COVID-19 vaccines. This finding sharply contrasts the result of the survey by UNESCO (2022) which reported high proportions of vaccinated teachers in countries like Portugal (100%), Chile (98%), Sweden (97%) and Saudi Arabia (96%). The high proportion of COVID-19 vaccinated teachers in those countries as reported by UNESCO

could be attributed to the high prevalence of COVID-19 and the associated high mortality rate in those countries as compared to Nigeria. The difference in the findings could also be attributed to the mandating of teacher vaccination as a condition to teach in those countries, whereas in Nigeria at large and Benue State in particular, such a condition is non-existent, and teachers are at liberty to decide to take COVID-19 vaccination or not.

This study also found that the proportion of COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State was very high (70.5%). This finding could be attributed to the misconceptions and conspiracy theories surrounding COVID-19 vaccines. The finding agrees with the result of a previous cross-sectional study which reported the proportion of COVID-19 vaccine hesitancy among staff of Nnamdi Azikiwe University, Awka, Anambra State, Nigeria at 65% (Uzochukwu et al., 2021). The finding is also in agreement with the result of a study among healthcare workers in Abia State, Nigeria which reported the proportion of COVID-19 vaccine hesitancy at 70.5% (Amuzie et al., 2021). The similarity of the findings could be due to the fact that all these studies were conducted in Nigeria where the prevalence of COVID-19 is not high, and many people tend to underestimate their chances of getting infected with COVID-19. This finding, however, differed from the results of studies conducted in other countries which reported lower proportions of COVID-19 vaccine hesitancy at 5% among secondary school teachers in New Jersey (Nguyen et al., 2023), and at 31.7% among teachers in a college at Taizhou, China (Chen et al., 2022). The lower proportions of COVID-19 vaccine hesitancy in these countries could be attributed to the more seriousness attached to COVID-19 because of its high prevalence and associated mortality rate recorded in those countries, and some policies that are being put in place to ensure compliance with vaccination.

This study found no significant association between gender and COVID-19 vaccine hesitancy among secondary school teachers in North-East Senatorial District of Benue State ($p > .05$). This finding could be explained by the non-difference in the perceptions and beliefs about COVID-19 and its' vaccines between men and women in Nigeria as reported by Chutiyami et al. (2022). The finding agrees with Uzochukwu et al. (2021) who also reported in their study among staff of a university in South-East Nigeria that gender did not significantly influence respondents' willingness to be vaccinated against COVID-19. The finding, however, contrasts the result of a study by Kose et al. (2021) which reported significant association between gender and COVID-19 vaccine hesitancy among healthcare professionals in Izmir, Turkey with men indicating more willingness to get vaccinated against COVID-19 than women. The variation in the findings could be that in Turkey, the study was among healthcare professionals and male healthcare workers may have considered themselves more exposed to the risks of COVID as they were usually at the frontline in the fight against COVID-19.

This study found significant association between age and COVID-19 vaccine hesitancy among secondary school teachers ($p < .05$). The younger participants were found more likely to hesitate to take COVID-19 vaccination than the older participants. This finding could be attributed to the wide-held belief that COVID-19 is only dangerous to the elderly persons, and because many young people are in the habit of taking alcoholic gins which some believe could provide protection against COVID-19 (Danabal et al., 2021). The finding could also be attributed to the belief among young people that they have strong natural immunity that could protect them against COVID-19. The elderly persons indicating more acceptance of COVID-19 vaccination than the younger ones could be attributed to their fear of susceptibility to COVID-19 due to some underlying ailing conditions of old age. This finding agrees with the results of a study by Okubo et al. (2022) which reported younger age as a significant factor associated with COVID-19 vaccine hesitancy. This finding agrees with Danabal et al. (2021) who observed that persons above 45 years of age were more likely to

accept vaccination because they considered themselves more susceptible to COVID-19 infection and death. Therefore, the fear of the disease is more in this age category leading to a more favourable attitude towards COVID-19 vaccines than in a younger age category.

Conclusion

This study concludes that the COVID-19 vaccination status of secondary school teachers in the North-East Senatorial District of Benue State was low. The proportion of vaccine hesitancy on the other hand was high. Younger age was a factor influencing COVID-19 vaccine hesitancy among the teachers. The study recommends making COVID-19 vaccination a condition for teaching in all schools in Benue State, and making people of younger age targets for intervention efforts in curbing COVID-19 vaccine hesitancy.

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