

# Determinants of COVID-19 Vaccine Acceptance in Ghana

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## ABSTRACT

**Background:** A proven strategy for saving lives from vaccine-preventable diseases is the timely vaccination of the people. In Ghana, there is considerable hesitation about the Covid-19 vaccines due to anxieties and uncertainties about their safety. With varying perceptions and beliefs being developed about Covid-19 vaccines, there is a likely negative effect on vaccine acceptance or otherwise. This study aims to ascertain the levels of acceptance of potential Covid-19 vaccine among Ghanaian adults, to identify predictors of vaccine acceptance or hesitance.

**Methodology:** A web based cross-sectional survey conducted among Ghanaians above 18 years, conducted between the month of February and March, 2021. Data were collected by administering online google forms (Questionnaire). The questionnaire was shared through social media platforms. A snowball sampling technique was used where researchers shared google forms to close friends and family. Analyses were conducted at p-value <0.05 using descriptive statistics, cross-tabulations and logistic regression.

**Results:** A total of 350 responses were achieved by end of data collection. Out of these, only 348 were considered for analysis based on the inclusion and exclusion criteria. Majority of the respondents (65.2%) were male, a third (30%) of them live in rural areas and about 57.5% were married. Factors such as age, educational level, prior vaccine acceptance history, personal vulnerability and self-feeling of health were significantly associated with covid-19 vaccine acceptance.

**Conclusion:** The results depict low acceptance rate for potential covid-19 vaccine among Ghanaians. Government and MoH should engage the media on its role in combating misinformation with regards the Covid-19 vaccine.

**Keywords:** coronavirus disease 2019 (Covid-19), vaccine, hesitance, acceptance.

## BACKGROUND

In countries with low and high income, vaccine trust is an increasingly significant public health concern, with declines in confidence contributing to well-documented cases of disease outbreaks, delays to global eradication of polio, other immunization targets, and divisive political discourse (Brown, 2010).

Understanding psychological factors, demographic factors, political predictors and vaccine skepticism are important in ensuring or facilitating vaccine acceptance. A research conducted in Denmark indicated that covid-19 vaccine patronage is 83% and in France and Hungary is 47%. Lack of concern about COVID-19, conspiratorial thinking, poor trust in scientist and authorities are

contributory factors to poor acceptance of covid-19 vaccine (Lindholt, Jørgensen, Bor, & Petersen, 2021).

Improved monitoring of vaccine trust and reluctance has been called upon by major organizations to inform the development of communication and other measures to resolve confidence gaps, preserve confidence in vaccines and immunization programs, and avoid confidence crisis and their implications for public health (Paterson, 2018; U.S. Department of Health and Human Services, 2015). In 1998, after Andrew Wakefield's publication of now-debunked studies suggesting correlations between the MMR vaccine and autism, the UK was the epicentre of perhaps the most infamous confidence crisis in closest memory, which led to widespread anxieties, decreases in vaccine acceptance and consequently measles outbreaks (Fegen, 2010). As it was the site of one of the most critical episodes of a vaccine trust crisis that had major public health implications, Nigeria has its own share of the phenomenon. A polio vaccination boycott was declared in August 2003 in five northern states which lasted for eleven months in Kano State, being resolved only in July 2004. The boycott triggered a revival of polio in Nigeria (Initiative, November, 2012). With the emergence of the SARS-Cov-2 since December, 2019 and its subsequent declaration as a public health emergency of international concern its vaccines have variously been developed and approved under certificates of emergency by the WHO and FDAs of nations for use in the fight against the COVID-19 pandemic (WHO, January, 2020).

UK and USA have witnessed a dramatic increase in patronage due to the presence of medical experts and states heads to get them inoculated with the covid-19 vaccine. The level of trust in the vaccine also increase due to people in authorities taking part in the vaccination process since the safety of the vaccine has been

questionable (John, Vergara, Sarmiento, Darwin, & Lagman, 2021).

Majority of participants (66.5%) strongly agreed that taking the vaccine is vital in the prevention of covid-19. About 60% of the study subjects agreed that pharmaceutical companies will be able to manufacture safe and effective Covid-19 vaccines. About 49.3% indicated that the side effects of Covid-19 vaccine could deter from taking it. Vaccine patronage can be enhanced by making it free for both rich and poor and creation of awareness on the technology behind the manufacturing of vaccine to redeem people trust on the vaccine (T. E. Id, Abualsamen, Almomani, Al-, & Alali, 2021).

Perceived cultural norms, perceived susceptibility, perceived negative and positive consequences, perceived safety of COVID-19 vaccines and trust perceived divine were the behavioral determinants of covid 19 vaccine in Dhaka. Based on the health believe model, cultural norms are key predictors of vaccine acceptance (A. K. Id et al., 2021).

Driven forces driven vaccine acceptance are religious believes, traditional remedies and alcohol use. Aichmophobia, underrating the need to take the vaccine and previous experience of undesirable side effects and perceive risk of infection (Pugliese-garcia et al., 2018).

Vaccine acceptance rate varies across countries and regions as well. Egypt and Tonga recorded 93% to 43%. Information related to covid-19 from government attracts more public attention and hence increase in vaccine acceptance. Vaccine hesitance and acceptance can be enhanced by public health authorities through systematic interventions. Low rate of vaccine acceptance is major source of public health concern. These results and specifically the low rate of acceptability is alarming to public health authorities and should stir further studies on the root causes and the need of awareness campaigns (Abdul & Mursheda, 2021).

Religious believes, residency of a person and age were predictors of covid-19 vaccine patronage. Malaysians has demonstrated high rate of vaccine patronage. On the contrary, though there is high patronage of vaccine in Malaysia, it is relevant to address the problems associated with the few vaccine hesitance issues by reinforcing trust in safety of vaccine and effectiveness via ample information (Alwi et al., 2021).

Predicting factors of vaccine patronage is imbibed in within various levels of socio-ecological model. These predictors include socio-demographic features: individual factors, organizational factors, individual and social factors (Al-jayyousi et al., 2021).

Majority of Ghanaians (51%) usually adults from urban centres are likely to take covid-19 vaccine if made available. Combination of vaccination programmes public health campaign will help to attain 63% to 70% herd immunity threshold in Ghana (Acheampong et al., 2021).

In Ghana for instance, there is an increasing concern for both the number of new infections and deaths urging the governments to announce plans to deploy over 20 million vaccines (GHS, February, 2021). With widespread myths and false news about the new vaccine in Ghana, it seems to have created a general confusion among the population with concerns the vaccine may be for purposes either than the prevention and control of SARS-nCov2. It has been recommended by WHO that anything associated with vaccine proxy and hesitancy should be continuously be monitored taking into account the importance and pervasiveness of information communication technology (Rosselli, Martini, & Bragazzi, 2016).

Previous research indicated that about 39.3% of health care professionals intended to receive the Covid-19 vaccines. Close relation being diagnosed of covid-19, sex, health worker category and trust in government policy towards controlling covid-19 are some of the predicting factors

of covid-19 vaccine acceptance (Agyekum, Afrifa-anane, Kyei-arthur, & Addo, 2021).

Convenience, confidence and complacency issues are important in the planning of strategies and design of activities that could have a great impact on covid-19 vaccine hesitancy. convenience issues revolves around reducing cost and promoting geographic accessibility of covid-19 vaccines and trust building steps can help redeem confidence of the people in the vaccine (Sage, 2014).

Majority 1,257 (53.1%) of the studied population expressed interest to take covid-19 vaccine whenever it is accessible. Men were more willing to take a Covid-19 vaccine than females (58.3 vs. 50.9%). People with health-related concerns were less willing to undertake the vaccination process. Moreover, participants who receive previous vaccine like influence are most like to take the covid-19 vaccine. Self-perceived chances of contracting the covid-19 improve the wiliness to get vaccinated (Ziyab, 2021).

### **Problem statement**

An established strategy for saving lives from vaccine-preventable diseases is the timely vaccination of the people. It can also help to achieve set goals, such as Goal 3 for Sustainable Development, which seeks to ensure healthier lives and encourage well-being for everyone (UNICEF, 2020).

Ghana has an enviable immunization coverage record that has led to reducing child mortality and diseases such as measles have witnessed decrease incidence rate. In 2019, the coverage of immunisation for important vaccinations was more than 90% (WHO, 2020). Ghana has not recorded a single measles death since 2003. Moreover, it was accredited in 2011 as having removed maternal and neonatal tetanus (UNICEF, 2020). Over the past one and half years, COVID-19 has become a global burden and many national and international bodies have woken up to the growing threats posed by the pandemic. Covid-19 pandemic have led to heavy shock on human lives, collapsing health systems and global economies. In

response to the emergency, the government of Ghana passed a number of executive instruments to contain the national and international spread of the virus. Despite the government's effort to contain the spread, COVID-19 damages persist, as more infections and deaths are being recorded in the wake of the UK and South African variants recorded among the Ghanaian population. Luckily, however, the world has made breakthroughs in vaccine development and production. Thus, the government of Ghana in a public announcement has indicated plans to vaccinate over 20 million Ghanaian people starting from March 2021 as indicated by Ghana's programme manager for the expanded programme of immunization (EPI).

This big announcement has provoked discussions among the populace in print, mass, and social media inter-alia. In the form of public scepticism about the COVID-19 vaccines, Ghana faces a potentially significant stumbling block. In Ghana, there is considerable hesitation about the COVID-19 vaccines due to anxieties and uncertainties about their safety. Those embers are fanning the spread of fake news, negative myths and disinformation on social media and in some quarters of the mainstream media. With varying perceptions and beliefs being developed about COVID-19 vaccines, there is a likely effect on vaccine acceptance or otherwise. Globally, vaccination is the safest and most effective way of preventing vaccine preventable diseases and one of the strategies in preventing the spread of covid-19. It is imperative to comprehend the state of mind and determinants of covid-19 vaccine acceptance in Ghana (Lamptey, Serwaa, & Appiah, 2021). pandemic, factors relating to low vaccine acceptance need to be urgently addressed by public health strategies (Agyekum, Afrifa-anane, Kyei-arthur, & Addo, 2021) (Ziyab, 2021).

Therefore, measuring progress towards public acceptance of the vaccines would be significant for government's planned rollout. A series of public surveys

to evaluate the evolving landscape of knowledge and attitudes on the subject matter would be a step forward. It is thus, crucial to conduct this study in an attempt to unearth the uncertainties surrounding COVID-19 vaccine acceptability among the Ghanaian people.

### **General objective of the study**

To ascertain the level of acceptance of the Covid-19 vaccine among Ghanaian adults and identify predictors of vaccine acceptance.

### **Specific Objectives**

1. Establish the prevalence of Covid-19 vaccine acceptance
2. To identify the determinants of Covid-19 vaccine acceptance (hesitance)
3. Identify beliefs and emotions surrounding Covid-19 vaccine acceptability

### **METHODOLOGY**

This was a web-based cross-sectional study conducted from February 24 to March 30, 2021. The target population for the study were Ghanaian adults aged 18 years and above who could read and understand the English language. Because of the limitations of deploying a face-to-face data collection approach during a pandemic, the data were collected by administering online google forms (Questionnaire). The questionnaire was shared through social media platforms; particularly, Facebook/messenger and WhatsApp. A snowball sampling technique was used where researchers shared google forms to close friends and family starting from 18+ and asked them to also share to their contacts until the sample size is reached.

Epi info version 7 was used to calculate the sample size for the study with a design effect of 1 and 5% error margin. Population survey for a simple random sampling option was preferred for the sample size calculation. To achieve effect sample size the researchers took the estimated total population of Ghana at 30m,

with an initial 20m citizens targeted for vaccination by government, the expected frequency was set at 67%. At 95% confidence level a sample size of 340 was therefore determined. However, we received in excess of 350 responses at the close of the survey and cleaned the data leaving 348 for analysis.

### Data analysis

Data was analysed using statistical package software for social sciences (SPSS IBM 20) after the initial cleansing of data on Microsoft Excel. Descriptive statistics was initially used to analyse the data. Chi square test was done to determine association between demographic characteristics and the variables. Significant variables were selected for further analysis to establish the extent of the association among predictors of vaccine hesitancy using multiple regression analysis. Confidence interval was set 95% and  $P < 0.05$  was considered statistically significant.

## RESULT

### Socio-demography of Respondents

A total of 350 responses were achieved by end of data collection. Out of these, only 348 were considered for analysis based on the inclusion and exclusion criteria. Only 2 (0.57%) of the respondents were below the minimum age 18 and accordingly deleted before final analysis. The ages of the participants range from 18 – 70 with a mean age of  $31.31 \pm 8.265$  and modal age group of 18 – 29 years.

Majority of the respondents (65.2%) were male, a third (32%) of them live in rural areas and about 57.5% were married. Educational status of participants varied, with more than half (55%) having tertiary education and 17.85% of them having at least senior high school education. In addition, 26.7% of respondents were resident in the southern part of Ghana while 93% others were resident in the northern part (Table 1).

**Table 1: Socio-demographic characteristics of Respondents**

Demographic characteristics	Frequency	Percentage (%)
<b>Variable</b>		
Age		
18-24	73	21
25-29	84	24.1
30-34	85	24.4
35-39	51	14.7
40-44	31	8.9
45+	24	6.9
Sex		
Female	121	34.8
Male	227	65.2
Marital Status		
Married	200	57.5
Unmarried	148	42.5
Educational Level		
No senior high school	93	26.7
senior high school	62	17.8
Tertiary	193	55.5
Setting		
Rural	112	32.2
Urban	236	67.8
Region of Residence		
Northern Ghana	255	73.3
Southern Ghana	93	26.7
Total	348	100

### Vaccine history, Perceived risk and overall self-feeling of health

Majority (76.7%) had been vaccinated against other communicable diseases prior to the planned COVID-19 vaccination. Specifically, more than one third of the participants had previously taken Hepatitis B (33.9%) or yellow fever (33%) vaccines respectively (Table 2).

A little over one third (33.3%) of the respondents predicted their risk of COVID-19 infection to be least possible, more than a third perceive/consider COVID-19 to be of a threat to their health (Table 2). However, majority (68.1%) predicted they will not get the virus, 27.6% predicted they will get a mild case of the virus and only 2.9% predicted they will get severely ill from COVID-19.

The considerable majority (91%) of the respondents rated their self-feeling of health as either excellent or very good.

Majority of the participants had concerns about the COVID-19 vaccine, a greater number (75.2%) have concerns about side effects and safety and approximately, more than half (65%) of the respondents have indicated their intention not to or not sure if they would take a jab when vaccine is ready.

Variable	Frequency	Percentage (%)
Have you been vaccinated against any disease before?		
No	81	23.3
Yes	267	76.7
Which of the following have you been vaccinated against?		
HB Virus	118	33.9
Yellow Fever	115	33
HB Virus; Yellow Fever	29	8.3
None	86	24.7
Have you heard of Covid-19?		
No	3	0.9
Yes	345	99.1
Do you stand a chance of getting infected with Covid-19		
No	116	33.3
Yes	232	66.7
Do you think it is a threat to your health and survival?		
No	124	35.6
Yes	224	64.4
What is your best guess as to whether you will get corona virus within the next six months?		
I don't think I will get the virus	237	68.1
I have had the virus already	5	1.4
I think I will get a mild case of the virus	96	27.6
I think I will get severely ill from the virus	10	2.9
Self-Feeling of Health		
Excellent	136	39
Fair/Poor	28	8.1
Very good	184	52.9
Total	348	100

Test of Association between respondents' socio-demographic characteristics and intention to accept the Covid-19 vaccine.

Based on Chi-square analysis there was a significant relationship in the ages of participants and the intention to accept Covid-19 vaccine ( $\chi^2 = 18.772$ ;  $p=0.001$ ). Sex of respondents and intention to accept a potential Covid-19 vaccine did not show significant differences. ( $\chi^2=6.362$ ;  $p=0.042$ ). Marital status and the intention to accept Covid-19 vaccine showed significant association ( $\chi^2=6.362$ ;  $p= 0.042$ ). Educational levels of participants were also found to be significantly associated with the intention to accept Covid-19 vaccine ( $\chi^2 =41.246$ ;  $p=0.014$ ). The study further established a significant association between settings (urban or rural); vaccination history and the intention to accept a Covid-19 vaccine. However, regional residential differences did not show any significant relationship ( $\chi^2 =2.553$ ;  $p= 0.279$ ).

Variable	N	No	Not Sure	Yes	Test Statistic $\chi^2$ (P)
Age					
18-29	157	29 (18.5%)	68(43.3%)	60(38.2%)	18.772(0.001)
30-39	136	47 (34.6%)	43(31.6%)	46(33.8%)	
40+	55	25 (45.5%)	13(23.6%)	17 (30.9%)	
Sex					
Female	121	38 (31.4%)	47(38.8%)	36(45.5%)	2.541(0.281)
Male	227	63 (27.8%)	77(33.9%)	87 (38.3%)	
Marital status					
Married	200	68 (34.0%)	63(31.5%)	69(34.5%)	6.362(0.042)
Unmarried	148	33 (22.3%)	61(41.2%)	54 (36.5%)	
Educational level					
Basic education	93	47(55.5%)	21(22.6%)	25 (26.9%)	41.246 (0.001)
Senior High Sch.	62	24 (38.7%)	21(33.9%)	17(27.4%)	
Tertiary	193	30 (15.5%)	82(42.5%)	81 (42.0%)	
Setting					
Rural	112	44 (39.3%)	33(29.5%)	35(31.2%)	8.540 (0.014)
Urban	236	57 (24.2%)	91(38.6%)	88 (37.3%)	
Region of residence					
Northern Ghana	255	98 (30.6)	93(36.5%)	84(32.9%)	2.553 (0.279)
Southern	93	23 (24.7%)	31(33.3%)	39 (41.9%)	
Have you taken a vaccine before					
No	81	43 (53.1%)	23 (28.4%)	15(18.5%)	1.072 (0.001)
Yes	267	58 (21.7%)	101(37.8%)	108 (40.4%)	
Previous vaccines taken					
Hepatitis B	118	20 (16.9%)	51 (43.2%)	47 (39.8%)	37.575 (0.001)
Hepatitis B & Yellow fever	29	14 (48.3%)	4 (13.8%)	11(37.9%)	
Yellow fever	48	25 (21.7%)	42 (36.7%)	48 (41.7%)	
None	86	42 (48.8%)	27 (31.4%)	17 (19.8%)	

### **Multivariate predictors of responding “not sure” or “no” Versus intention to accept COVID-19 vaccine.**

#### **NO VERSUS YES**

The regression analysis shows a strong relationship between age and vaccine acceptance. holding all other variables constant, the odds of a participants within the ages of 18-29 years selecting “no” rather than “yes” for Covid-19 vaccine acceptance is 0.253 times lower than someone who falls within age 40+ with a  $p=0.015$ . The odds of participants aged 30-39 years selecting “no” rather than “yes” for Covid-19 vaccine is 0.656 times lower than participants within the 40+ age group.

The odds of married participants selecting no instead of yes for vaccination is 0.734 lower compared to those who are not married.

Participants with no senior high school education have 2.553 odds higher of selecting “no” rather than “yes” for Covid-19 vaccine acceptance compared to those with tertiary education. For those with senior high school education, the odds of selecting no rather than yes is 6.617 higher than those with tertiary education.

Individuals who had not taken any vaccine in the past have 2.769 odds higher of selecting no rather than yes for Covid-19 vaccine acceptance compared to persons who have taken any vaccination in the past.

The odds of persons who feel they do not stand the chance of getting Covid-19 infection selecting no rather than yes for Covid-19 vaccine acceptance is 3.376 times higher compared to individuals who feel they stand the chance of getting Covid-19 infection.

The odds of individuals with excellent rating of their personal health selecting not sure rather yes for Covid-19 vaccine is 2.256 higher than those who feel very good about their personal health. For those who feel less (fair/poor) of their personal health, the odds of selecting not sure for Covid-19 rather yes is 0.205 higher

compared to those who feel very good about their personal health.

#### **Not sure versus yes**

The odds of participants within the age bracket 18-29 selecting “not sure” rather than “yes” for Covid-19 vaccine was 1.131 higher compared to participants at 40 and above. On the other hand, those within 30-39 years, the odds of selecting “not sure” rather than “yes” was 0.991 lower compared to participants who were 40+ years.

The odds of married participants showing vaccine hesitancy (not sure) rather than accept (yes) the Covid-19 vaccine was 0.916 lower compared to participants who were not married.

The odds of participants with no SHS education selecting not sure rather yes for Covid-19 vaccine 0.373 lower compared to those with tertiary education. For those with senior high school education, the odds of selecting not sure rather than yes for Covid-19 vaccine was 0.497 higher compared to those with tertiary education.

The odds of those who had not taken a vaccine in the past selecting “not sure” rather than “yes” for Covid-19 was 1.366 higher compared to those participants who had no vaccination experience.

The odds of participants who ruled out their chances of getting infected selecting not sure rather than yes for the Covid-19 was 0.955 higher compared to those who believe they stand a chance of Covid-19 infection.

The odds of individuals with excellent rating of their personal health selecting not sure rather yes for Covid-19 vaccine is 0.779 lower compared to those who feel very good about their personal health. For those who feel less (fair/poor) of their personal health, the odds of selecting not sure for Covid-19 rather yes is 0.384 lower compared to those who feel very good about their personal health.

Table 4: Multivariate predictors of responding ‘not sure’ or ‘no’ Versus intention to vaccinate

Would you accept a Covid-19 dose as to be rolled out by government of Ghana	B	Std. Error	p Value	Odds (EXP(B))	Confidence Interval	
					Lower	Upper
NO Vs YES						
Age (years)						
18-29	-1.375	0.565	0.015	0.253	0.083	0.765
30-39	-0.422	0.455	0.353	0.656	0.33	1.595
40+	Reference					
Marital status						
Married	-0.309	0.408	0.45	0.734	0.33	1.634
Not Married	Reference					
Educational level						
No Senior High Sch	0.937	0.399	0.019	2.553	1.169	5.578
Senior High School	0.962	0.427	0.024	2.617	1.133	6.043
Tertiary	Reference					
Have you taken a vaccine before						
No	1.018	0.405	0.012	2.769	1.251	6.127
Yes	Reference					
Do you stand a chance of Covid-19 infection						
No	1.217	0.347	0.001	3.376	1.709	6.67
Yes	Reference					
Self-feeling of health						
Excellent	0.814	0.321	0.011	2.256	1.201	4.236
Fair/poor	1.587	0.74	0.032	0.205	0.048	0.873
very good	Reference					
Not sure Vs. Yes						
Age (years)						
18-29	0.123	0.501	0.806	1.131	0.4213	3.021
30-39	-0.009	0.456	0.985	0.991	0.406	2.422
40+	Reference					
Marital status						
Married	-0.087	0.321	0.785	0.916	0.488	1.72
Not Married	Reference					
Educational level						
No Senior High Sch.	-0.233	0.385	0.546	0.793	0.373	1.685
Senior High School	0.054	0.385	0.888	1.056	0.497	2.245
Tertiary	Reference					
Have you taken a vaccine before						
No	0.312	0.394	0.429	1.366	0.631	2.96
Yes	Reference					
Do you stand a chance of Covid-19 infection						
No	0.57	0.314	0.07	1.768	0.955	3.274
Yes	Reference					
Self-feeling of health						
Excellent	-0.25	0.286	0.381	0.779	0.445	1.363
Fair/poor	-0.957	0.47	0.042	0.384	0.153	0.965
very good	Reference					

## DISCUSSION

Vaccination is one of the proven means of achieving herd immunity against outbreak of diseases. Though not much is available relative to the possibility of achieving herd immunity against SARS-nCov2 through vaccination roll outs, it is still considered a big intervention and recommended heavily by the world health organisation (WHO). Researchers have reported vaccine acceptance rates globally, revealing high acceptance rates in Indonesia, Malaysia, and China and showing poor acceptance rate in France, Italy, Russia, and United States (Sallam,

2021). Our study showed Covid-19 vaccine acceptance at an incredible (35%) lower level compared to the acceptance levels of 69% among adults in the United States (Reiter, Michael, and Mira 2020). A reported 53.1% acceptance among participants in Kuwait (Alqudeimat et al, 2021) and 55% among a representative sample in Russia (Lazarus et al., 2020). With the government of Ghana aim of achieving a herd immunity, the observed 35% acceptance level in the current study suggest an urgent call for public health interventions to improve acceptance of a



potential Covid-19 vaccine when made available.

In this particular study of a nationally representative sample, 65% of participants indicated hesitancy to be vaccinated against Covid-19 as a planned rollout was announced by the government of Ghana. This finding is especially in synch with earlier findings of a study conducted in USA (Fisher et al., 2020). In urban and rural India, 19.5% and 40.7% were either refusing the vaccine outright or show hesitance towards taken a jab (Danabal et al., 2021) with the case of urban and rural Ghana, 62.8% and 68.8% were outright in either rejecting a jab or being hesitant towards it. This situation in Ghana per this study is even more precarious comparative to India. Especially considering that the study was conducted during February ending and March 2021, when the number of hospitalization and deaths per day were on the increase due to the second wave of Covid-19 in Ghana. This is also particularly at total variance with a similar study conducted in Malaysia which recorded 16.7% hesitance (Alwi et al., 2021). This may be associated with the feeling of safe over the diseases as data from the study indicate that 68.1% of respondents feel they are safe from the threat of Covid-19.

The percentage of individuals who intend to be vaccinated is approximately 35% which is incredibly lower than the 83.3% in Malaysia and also the percentage of people who have received vaccinations against other disease conditions in the past (76.7%) within Ghana.

For this study, variables such as age, marital status, educational level, place of residence and vaccine history were all significant influencing determinants for Covid-19 vaccine acceptance. In other Indonesian study, Harapan et al., (2020) did not find any significant association between vaccine acceptance and socio-demographic characteristics. However, studies in China and Saudi only shows gender and marital status to have significant association with Covid-19 vaccine acceptance (Wang et al.,

2020) and (Magadmi & Kamel, 2021). The variations in the outcome of these studies maybe attributable to methodological and socio-demographic disparities in the populations understudied.

Further test of the degree of associations in a multiple regression analysis have shown that factors such as age, educational level, vaccine history, personal vulnerability and self-feeling of health were significant determinants of Covid-19 vaccine acceptance.

The propensity for respondents within the ages of 18-29 rejecting the Covid-19 vaccine when made available was lower compared to participants who were 40+. However, they were 1.131 times more likely to show hesitancy towards vaccine uptake compared to the oldest group. This finding seems to debunk those of Robertson et al., (2021) who revealed that residents of ages 25-34 years show more hesitancy to Covid-19 vaccine uptake compared to those above 45 years in the UK. It however, contrasts the finding made by Alwi et al., (2021) that the advanced age group (age 60+) were more likely to show hesitancy towards Covid-19 vaccine. Interestingly, acceptability to a potential vaccine was decreasing with increase in age of participants. With 18-29 again showing higher percentage (38.2%) of acceptance of a potential Covid-19 vaccine compared to their older counterpart (30.9%). Similar relationship has been reported in the United States with 71% acceptability among respondents aged 18-29 compared to 64% of those in advanced age (50+) group (Reiter et al., 2020). Fisher et al., (2020) have shown a contrasting findings that acceptability increases with age. In deed only 55 were of the age 40+ and the lower representation could potential explain be attributed to the mode of distribution of questionnaire as the elderly group may have limited access smart phones. Nonetheless, it remains a public health imperative for local public health strategies to aim at improving potential Covid-19 vaccine acceptance among the elderly. As they are more susceptible to

Covid-19 related complications (Bonanad et al., 2020).

It is not surprising that in this study individuals with tertiary education were more opened to accept any potential vaccine when made available as educated persons have better appreciation of the protective benefits of vaccines. People who had no form of education had education had a decreased intention to receive the vaccine. In contrasts, Handebo et al., (2021) found a relationship where persons with tertiary education have a decreased intention to receive the Covid-19 vaccine. However, our findings confirms a US study where increase in education levels were associated with increase intent to vaccinate. And in Australia COVID-19 vaccine hesitancy were related to lower educational status (Dodd et al, 2021).

We also found that vaccine acceptance history was a determinant for potential Covid-19 vaccine acceptance. Reluctance to accept the vaccine was more among those who had no vaccination experience compared to those who had taken a vaccine before. This outcome finds support in Kuwait where individuals with prior influenza vaccination were more opened to accept the Covid-19 vaccine (Alqudeimat, 2021).

Some of the participants ruled out their risk of Covid-19 infection and for that matter they are unwilling to accept the Covid-19 vaccine when made available. This perceptions are perhaps driven by lack of information or misinformation as several rumours were being spread about the disease. Respondents with excellent and poor rating of their personal health were more likely to accept a potential Covid-19 vaccine rather reject or show hesitance compared to others who rated their personal health to be very good.

This finding is particularly not in tandem to the findings of Fisher et al. (2020) in USA where persons who previously received influenza vaccine and intention to vaccinate were closely related.

The reluctance to accept the Covid-19 vaccine is surprising owing to the continuous rise in the number of reported cases, death rate, and social disruptions prevalent in media reportage within the country and across the globe. The predictors of vaccine hesitancy have been to forecast the primary basis for a decision to vaccinate against Covid-19 or otherwise.

## CONCLUSION AND RECOMMENDATIONS

The results show a low rate of potential Covid-19 vaccine acceptance among Ghanaian adult population. This is incredibly lower than other studies conducted in Western and Asian countries. Vaccine safety as found to be one key stumbling block to vaccine acceptance is largely believed to be tied to the growing misinformation about challenges that may arise after taking a jab. Much of that will also depend on media coverage. It is therefore crucial for government and the MoH to engage the media on its role in combating misinformation as regards the Covid-19 vaccine.

Government of Ghana and relevant agencies should increase their campaign and prepare to implement mass immunisation drive. It remains an imperative to address concerns among the majority of hesitant persons by building trust in vaccine safety and effectiveness through adequate information regarding the vaccine. In carrying out the mass vaccination exercise, researchers should continue to assess vaccine acceptance and complemented by health education to address emerging concerns during the programme.

Public health officials would have to be laser-focused on detecting and resolving both reasonable apprehensions and hypotheses of conspiracy in order to meet this task. Owing to the complex and viral nature of vaccine misinformation, they will have to be vigilant in tracking digital channels as well.

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