

Vaccine Confidence: Covid-19 Vaccine and Hepatitis B Vaccine Knowledge, Attitude and Belief among Health Science Students in a University in Eastern Nigeria

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Abstract Background: Both hepatitis B and coronavirus vaccines are important requirement for all health science student because of their potential exposure to hepatitis B and coronavirus diseases during their clinical experience. Vaccine uptake has recently been affected by lack of confidence to their efficacy and safety. This attitude is vaccine dependent and understanding of the determinants will help to prevent vaccine hesitancy. This study was designed to compare the attitude of health science student toward hepatitis B vaccine and coronavirus vaccine. Method: A descriptive cross-sectional study carried out among students of one of the colleges of health sciences in Enugu Nigeria. The students comprised of medical students, medical laboratory students and nursing students who visit the hospital for their clinical postings and experiences. Three, two and two classes in the departments of medicine, medical laboratory science and nursing science respectively met the inclusion criteria for the study. They are six hundred and two students in the three departments of the college. Two classes were selected from the department of medicine and one class each from the department of medical laboratory science and nursing science respectively using simple random sampling method. A total of 303 (135; medicine students, 85; medical laboratory and 83; nursing students) students were in the selected classes and all of them participated in the study. The questionnaires were distributed to all the students in the selected classes during their lectures. A pre-tested self-administered questionnaire was used to assess the knowledge, attitude and vaccine status, and beliefs concerning Hepatitis B vaccines and coronavirus vaccine. The questions on knowledge were adopted from related literatures while questions on attitude were adopted from Parental Attitude on Childhood Vaccine (PACV) questions and Global Vaccine Confidence (GVC) survey. The findings and scores were analysed using IBM SPSS Statistic software for windows (SPSS statistical software V.21 (IBM Corp. 2019). Total of 11 responses were incomplete in either one or more questions and they were all removed bringing the total number of valid participants to 292. The age of the respondents was grouped, and the simple mean obtained. Scores on knowledge were calculated by scoring correct response as 1 and scoring incorrect as 0. All 'I don't know' responses were regarded as negative answer. A score of less than 50% correct responses was regarded as 'less than average', and 50% or more correct responses was regarded as 'above average'. The attitude of the students towards hepatitis B vaccine and coronavirus vaccine were compared using chi-square and the p-value less than 0.05 was regarded as statistically significant. Results: Out of 303 students, 292 responded to all the questions while 11 were incomplete. Two hundred and four participants (69.9) were females while 88(30.1) were males with the mean age of 22.6 SD 2.6. The medical students, nursing students and medical laboratory students contributed to 134(45.9), 81(27.7) and 77(26.4) respectively. On the general knowledge, 282(96.6%) had knowledge above average. Although the responses to the question 'Upon discovery of vaccine for a particular disease, the "efficacy" of the vaccine will be considered before approval by the appropriate organizations' were little above average, 161(55.1). The students had better attitude towards hepatitis B vaccine than coronavirus vaccine. For instance, 114(39%) students had decided not to have coronavirus vaccine against 43(14.7%) for hepatitis B vaccine. Again, 204(69.9) and 125(42.8) expressed concern on the 'safe' of coronavirus vaccine and hepatitis B vaccine, respectively. Similar responses were observed on the question concerning the side effect of the two vaccines. The questions on the 'Trust': the respondent expressed significant distrust to their doctors, government, media, and their spiritual leader concerning the coronavirus than the hepatitis B vaccine. The difference in the responses on the 'efficacy' of the two vaccine was not significant. In the practice domain, the majority of the students have not had both hepatitis B and coronavirus vaccine. There was significant difference between those who indicated wiliness to take hepatitis B vaccine and coronavirus vaccine as soon as they are available. In conclusion: The knowledge about vaccine as expressed by the students in this study was above average. They expressed negative attitude to coronavirus vaccine than hepatitis B vaccine. The student expressed concern on the efficacy of the two vaccines and the vaccine generally. It was also observed that many of the students have not had hepatitis B vaccine

despite their willingness. It therefore important to introduce the concept of vaccine confidence in the health science curriculum and emphasis should be made on the efficacy of vaccines. There is also a need to scale up hepatitis B vaccine coverage among students of health sciences.

Keywords: coronavirus vaccine hesitance, vaccine uptake, vaccine myth and superstition, coronavirus vaccine efficacy, immunisation coverage

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1. Background

Coronavirus Disease 2019 (COVID-19) Vaccine administration is ongoing in many countries [1]. They have been satisfied safe and effective against the strains of COVID-19 viruses and like other vaccines preventable disease, there is prediction that it would check the entire disease burden globally [2].

Many countries especially the developing nations are yet to commence the mass administration of the Vaccine [3].

In Nigeria, the plan for purchase and mass administration of the vaccine is ongoing although the exert picture on incidence and the disease burden is poorly understood because of undertesting [4,5]. The likely bottleneck as soon as it is available in the country is the issue of vaccine acceptance [6,7,8]. Will lack of confidence and hesitant attitude fuelled by superstition and myths affect the coverage? This negative attitude has led to inability to eliminate polio in the country and is also responsible for increasing burden of measles [9,10,11].

Health science students are exposed to infectious disease during their clinical postings and attachment [12]. They are also critical in infection disease transmission in the communities since some reside outside the school hostel [13]. Pre-exposure vaccination against infectious diseases such as Hepatitis-B is usually recommended for this group [14]. Studies showed that Hepatitis-B Vaccine uptake in this population is high with low negative attitude and has reduced the disease among them [15,16]. Similarly, optimal coverage of COVID-19 vaccine among the students will not only protect them against the coronavirus but will prevent the transmission in the community.

This study was designed to compare the knowledge and attitude of the health science student to COVID-19 and Hepatitis-B vaccine.

The following research questions guided the study:

- (i) What do health science students know about vaccines?
- (ii) What is the attitude of health science students towards Covid-19 vaccine compared to hepatitis B vaccine.
- (iii) What are the Covid-19 and hepatitis B vaccination status of the health science students.

2. Methods

2.1. Study Population

The targeted populations are health science student of Enugu State faculty of health science. They comprised of

602 medical students, medical laboratory students and nursing students who visit the hospital for their clinical postings and experiences. The faculty is part of Enugu State University of Technology. It is in Enugu town, within the state Teaching Hospital (Figure 1).

2.2. Study Design

This study was a descriptive cross-sectional survey to assess the general knowledge on vaccines and compare the attitude and practice of the health science students to hepatitis B and covid-19 vaccine. The study was carried out in February 2021 and involved pretested questionnaire distributed among the students. All students who gave consent were included while those who declined consent were excluded.

2.3. Sample Size Determination

The sample size for this study was determined by using modified Cochran Formula for Sample Size Calculation in Smaller Populations (602 students) by considering the following assumptions: The proportion of good knowledge, attitude and practice on hepatitis B and COVID-19 vaccine was 50% since no similar study has been done in the state: By taking the prevalence of 50%, level of (significance 5% ($\alpha = 0.05$), $Z_{\alpha/2} = 1.96$, and margin of error 5% ($d = 0.05$), we used the following correction formula:

$$n_0 = (Z_{\alpha/2}) \times XP(1-P)/d^2,$$

$$N = (1.962) \times 0.5(1-0.5)/(0.05)^2 = 384$$

$$n = n_0 / 1 + ((n_0 - 1) / N),$$

$$328 / 1 + ((328 - 1) / 602) = 234.7.$$

By adding 10 % non-response rate, a minimum of 258 sample size is required. However, for this study 292 students participated.

2.4. Sampling Technique

They were six hundred and two students in the three departments of the college. Two classes were selected from the department of medicine and one class each from the department of medical laboratory science and nursing science respectively using simple random sampling method. A total of 303 (135; medicine students, 85; medical laboratory and 83; nursing students) students were in the selected classes and all of them participated in the study. The questionnaires were distributed when all

the students were seated in their respective classes for their lectures. Consents were also obtained from their

lectures before distribution, filling and collection of the questionnaires.

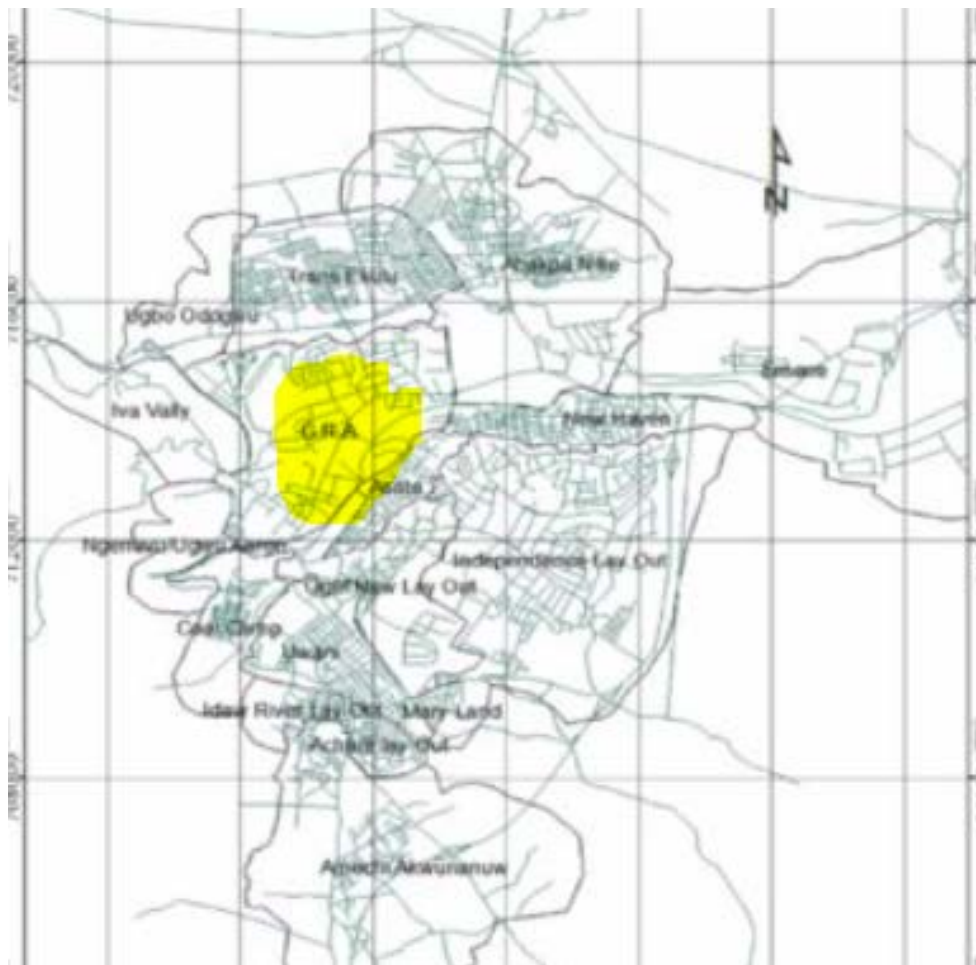


Figure 1. location of college of medicine (sourced from google map)

2.5. Data Collection and Management

Data were collected by using a structured questionnaire that was pretested before the actual data collection was conducted. The questionnaire is composed of written consents, socio-demographic variables, knowledge on vaccine and attitude questions concerning hepatitis B and COVID-19 vaccines which were developed by adopting from different peer-reviewed literature [6,7,8,17,18,19].

A 64-item self-administered questionnaire, designed to measure demographics, knowledge, attitude and practice on hepatitis B and COVID-19 was used. The questionnaire comprised of six domain questions. The first domain contained five questions on the socio-demographical characteristics of the respondents. The second domain was designed to assess the knowledge of vaccines. The questions (twenty-nine in number) in this domain were adapted by the authors from extensive literature review [6,8] and were also critiqued and corrected by academics who were involved in vaccine production. The questions centred on production, regulation, preservation and use of vaccines. The third and fifth domains were designed to assess the attitude on hepatitis B and COVID-19 vaccines, respectively. These domains were made up of thirteen questions each. Some of the questions were extracted (and/or modified) from both global vaccine confidence survey and parental attitude on childhood vaccine (PACV)

[17,18,19]. The questions in this domain focused on confidence towards hepatitis B and COVID-19 vaccines and trust in medical profession, government, media, and religious leaders concerning hepatitis B and COVID-19 vaccines. The last two domains contain four questions each on the vaccine status of hepatitis B and coronavirus prevention through the use of vaccine and campaign.

Pilot study was done on 33 students of another health science institution. The pilot study helped to ensure face validity. This also helped to assess the feasibility of the studies and validate the questionnaire in terms of the logistic of the data collection, the clarity of the questions and the time cost (8-10minutes) to complete the questionnaire. The questionnaire was validated by an expert community physician to ensure clarity of instruction and appropriateness of the items in addressing the purpose and problems of the study. The critical appraisals and comments of the experts were used for reforming the items.; five question Likert scale was collapsed to Yes and NO by considering the strongly agreed and agreed to be Yes while neutral, disagree and strongly disagreed were regarded as NO. Cronbach's alpha showed the questionnaire to reach acceptable reliability, $\alpha=0.79$.

The questionnaire was translated to Igbo language and back-translated to ensure that the original meaning of the questions were retained. To ensure data quality, training

was given to data collectors and supervisors. The data collection process was strictly followed up by the supervisor and principal investigators and the quality of the collected data was assessed by the principal investigators.

Scores on knowledge were calculated by scoring correct response as 1 and scoring incorrect as 0. All 'I don't know' responses were regarded as negative answer. Total of 11 responses were incomplete in either one or more question, and they were all removed bringing the total number of valid participants to 292. A score of less than 50% correct responses was regarded as 'less than average', and 50% or more correct responses was regarded as 'above average'.

2.6. Data Analysis

The findings and scores were analyzed using IBM SPSS Statistic software for windows (SPSS statistical software V.21 (IBM Corp. 2019). Descriptive statistics were used to analyze sociodemographic details of all participants and presented in a table. Chi square was used to compare the responses of the students to the two vaccines. Finally, significant difference is set at a P-value less than 0.05.

3. Results

Table 1 shows the characteristic of the participants: Out of 292 students who participated in the study, 204(69.9)

were females while 88(30.1) were males. Majority of them were in the age group of 21years to 25years with mean of 22.6 SD 2.6 and Only 13 students were married. The college had only three departments that visit the hospital for clinical experience; in this study, medical students, nursing students and medical laboratory students contributed to 134(45.9), 81(27.7) and 77(26.4) respectively.

Table 1. Sociodemographic of the Students

| Serial Number | Students Characteristics | N(%) |
|---------------|----------------------------|-----------|
| 1 | Sex | |
| | Male | 88(30.1) |
| | Female | 204(69.9) |
| 2 | Age | |
| | <15 | 0(0) |
| | 15-20 | 47(16.1) |
| | 21-25 | 217(74.3) |
| | 26-30 | 28(9.6) |
| 3 | Marital Status | |
| | Single | 278(95.2) |
| | Married | 13(4.5) |
| | Divorced | 1(0.30) |
| 4 | Department | |
| | Medicine | 134(45.9) |
| | Medical Laboratory science | 77(26.4) |
| | nursing | 81(27.7) |
| 5 | Religion | |
| | Roman Catholic | 208(71.2) |
| | protestant | 78(26.7) |
| | Muslim | 1(0.3) |
| | Tradition | 5(1.7) |

Table 2. Knowledge of the Student on vaccines

| Serial Number | Items | Response N (%) | | | N(%) |
|---------------|---|----------------|-----------|--------------|----------|
| | | True | False | I DON'T KNOW | |
| 1 | Vaccines are drugs | 174(59.6) | 115(39.4) | 3(1) | 292(100) |
| 2 | Vaccines are poison | 14(4.8) | 278(95.2) | 0(0) | 292(100) |
| 3 | Vaccines are dead microorganisms | 115(39.4) | 117(60.6) | 0(0) | 292(100) |
| 4 | Vaccines are live microorganisms | 89(30.5) | 202(69.2) | 1(0.3) | 292(100) |
| 5 | Vaccines are part of microorganisms | 102(34.9) | 187(64) | 3(1) | 292(100) |
| 6 | Vaccines are manufactured by the pharmaceutical company | 250(85.6) | 40(13.7) | 2(0.7) | 292(100) |
| 7 | Vaccines are manufactured by the medical laboratories | 104(35.6) | 184(63) | 4(1.4) | 292(100) |
| 8 | Vaccines are manufactured by the hospitals | 25(8.6) | 261(89.4) | 6(2.1) | 292(100) |
| 9 | Vaccines are manufactured by the universities | 30(10.3) | 256(87.7) | 1(0.3) | 292(100) |
| 10 | Upon discovery of vaccine, it is approved by the pharmaceutical companies | 84(28.8) | 203(69.5) | 5(1.7) | 292(100) |
| 11 | Upon discovery of vaccine, it is approved by the regulatory bodies | 232(79.5) | 59(20.2) | 1(0.3) | 292(100) |
| 12 | Upon discovery of vaccine, it is approved by the politicians | 16(5.5) | 272(93.2) | 4(1.4) | 292(100) |
| 13 | Upon discovery of vaccine, it is approved by the hospitals | 54(18.5) | 233(79.8) | 5(1.7) | 292(100) |
| 14 | Upon discovery of vaccine for a particular disease, the "safe" of the vaccine will be considered before approval by the appropriate organizations. | 233(79.8) | 59(20.2) | 0(0) | 292(100) |
| 15 | Upon discovery of vaccine for a particular disease, the "effectiveness" of the vaccine will be considered before approval by the appropriate organizations. | 161(55.1) | 130(44.5) | 1(0.3) | 292(100) |
| 16 | Upon discovery of vaccine for a particular disease, the "cost" of the vaccine will be considered before approval by the appropriate organizations | 225(77.1) | 67(22.9) | 0(0) | 292(100) |
| 17 | The common route of vaccine administration is oral | 175(59.9) | 115(39.4) | 2(0.7) | 292(100) |
| 18 | The common route of vaccine administration is muscular | 234(80.1) | 58(19.9) | 0(0) | |
| 19 | The common route of vaccine administration is intravenous | 110(37.7) | 178(61.) | 4(1.4) | 292(100) |
| 20 | Vaccines are used for prevention of diseases | 274(93.8) | 17(12) | 1(0.3) | 292(100) |
| 21 | Vaccines are used for treatment of diseases | 35(12) | 255(87.3) | 1(0.3) | 292(100) |
| 22 | Vaccines are used for reduction of disease | 97(33.2) | 191(65.4) | 4(1.4) | 292(100) |
| 23 | Vaccines are used for curing of disease | 23(7.9) | 265(90.8) | 4(1.4) | 292(100) |
| 24 | Vaccines are administered to children only | 38(13) | 254(87) | 0(0) | 292(100) |
| 25 | Vaccines are administered to adult only | 35(12) | 257(88) | 0(0) | 292(100) |
| 26 | Vaccines are administered to exposed population only | 77(26.4) | 215(73.6) | 0(0) | 292(100) |
| 27 | Vaccines are administered to at risk population | 228(78.1) | 63(21.6) | 1(0.3) | 292(100) |
| 28 | Vaccines are specific for a particular disease. | 273(93.5) | 11(3.8) | 8(2.7) | 292(100) |
| 29 | One type of vaccine can protect against many diseases | 55(18.8) | 203(69.5) | 34(11.6) | 292(100) |

Table 2 represents the response of the students to the individual questions on the knowledge of vaccine. The total score was calculated, 282(96.6%) scored above average. The right responses to the question ‘Upon discovery of vaccine for a particular disease, the “effectiveness” of the vaccine will be considered before approval by the appropriate organizations’ were little above average, 161(55.1) while the right responses on the safety of vaccine were 233(79.8%).

Attitude of the students towards hepatitis B and coronavirus vaccine as represented in the Table 3 shows that the students have better attitude towards hepatitis B vaccine than coronavirus vaccine. For instance, 114(39%) students had decided not to have coronavirus vaccine against 43(14.7%) for hepatitis B vaccine. Again, 204(69.9) and 125(42.8) expressed concern on the safety of coronavirus vaccine and hepatitis B vaccine, respectively. Similar responses were observed on the question concerning the side effect of the two vaccines. The questions on the ‘Trust’: the respondent expressed

significant distrust to their doctors, government, media, and their spiritual leader concerning the coronavirus than the hepatitis B vaccine. The difference in the responses on the effectiveness of the two vaccine was not significant although high uncertainty was observed among responses towards coronavirus vaccine 207(70.9%) than hepatitis B 33(11.3%) vaccine.

In the vaccination status domain, the majority of the students have not had both hepatitis B and coronavirus vaccine. There was significant difference between those who indicated willingness to take hepatitis B vaccine 93(32.7) and coronavirus vaccine (93.9) as soon as it is available. Also in the domain, there is significant difference in the response of the students as regards persuading their loved ones or fellow students to take hepatitis B vaccine 225(77.1) and coronavirus vaccine 132(45.2).

The Table 4 represented the reasons for not expressing willness to take the vaccine. It also highlighted the beliefs regarding the two vaccines.

Table 3. The student’s attitude towards hepatitis B and coronavirus vaccines

| Serial Number | Items | Response | Hepatitis B | Coronavirus | p-value |
|--|--|---------------|-------------|-------------|---------|
| Attitude | | | | | |
| 1 | Have you ever decided not to have hepatitis B/coronavirus vaccine | YES | 43(14.7) | 114(39) | 0.028 |
| | | NO | 233(79.8) | 135(46) | |
| | | I DON'T KNOW | 16(5.5) | 43(14.7) | |
| 2 | In the scale of 1-10, how sure are you that hepatitis B/coronavirus vaccine recommendation is a good idea for the people | 0-4 | 23(7.9) | 125(42.8) | 0.000 |
| | | 5-6 | 44(15.1) | 71(24.3) | |
| | | 7-10 | 224(76.7) | 96(32.9) | |
| 3 | Is it better to develop immunity by getting hepatitis B/coronavirus than to get a vaccine | Agreed | 41(14) | 68(23.3) | 0.000 |
| | | Not sure | 58(19.9) | 91(31.2) | |
| | | Disagreed | 193(66.1) | 132(45.2) | |
| 4 | Hepatitis B/coronavirus vaccine is effective. | Agreed | 241(82.5) | 64(21.9) | 0.363 |
| | | Not sure | 33(11.3) | 207(70.9) | |
| | | Disagreed | 13(4.5) | 64(21.9) | |
| 5 | Hepatitis B/coronavirus vaccine is important for me. | Agreed | 246(84.2) | 152(52.1) | 0.000 |
| | | Not sure | 33(11.3) | 109(37.3) | |
| | | Disagreed | 13(4.5) | 31(10.6) | |
| 6 | How concerned are you that you might have serious side effect from the hepatitis B/coronavirus vaccine | Concerned | 126(44.2) | 175(59.9) | 0.000 |
| | | Not sure | 116(39.7) | 89(30.5) | |
| | | Not concerned | 47(16.1) | 28(9.6) | |
| 7 | How concerned are you that the Hepatitis B/coronavirus vaccine might not be safe | Concerned | 125(42.8) | 204(69.9) | 0.000 |
| | | Not sure | 106(36.3) | 69(23.6) | |
| | | Not concerned | 61(20.9) | 19(6.5) | |
| 8 | I am able to openly discuss my concern about hepatitis B/coronavirus vaccine with my doctor | Yes | 241(82.5) | 213(72.9) | 0.000 |
| | | No | 28(9.6) | 44(15.1) | |
| | | I don't know | 23(7.9) | 35(12) | |
| 9 | I scale of 1-10: All things considered, how much do you trust your doctors concerning hepatitis B/coronavirus vaccine | 0-4 | 36(12.3) | 96(32) | 0.000 |
| | | 5-6 | 83(28.4) | 80(27.4) | |
| | | 7-10 | 83(28.4) | 116(39.7) | |
| 10 | I scale of 1-10: All things considered, how much do you trust your government concerning hepatitis B/coronavirus vaccine | 0-4 | 173(56.2) | 226(77.4) | 0.000 |
| | | 5-6 | 75(25.7) | 40(13.7) | |
| | | 7-10 | 44(15.1) | 26(8.9) | |
| 11 | I scale of 1-10: All things considered, how much do you trust your media concerning hepatitis B/coronavirus vaccine | 0-4 | 147(50.3) | 178(61) | 0.000 |
| | | 5-6 | 72(24.7) | 61(20.9) | |
| | | 7-10 | 73(25) | 53(18.2) | |
| 12 | I scale of 1-10: All things considered, how much do you trust your priest/pastor/Iman concerning hepatitis B/coronavirus vaccine | 0-4 | 123(42.1) | 164(56.2) | 0.000 |
| | | 5-6 | 95(32.5) | 70(24) | |
| | | 7-10 | 74(25.3) | 58(19.9) | |
| Vaccination status and other findings | | | | | |
| 1 | Have you taken hepatitis B/coronavirus vaccine | YES | 62(21.2) | 7(2.4) | 0.938 |
| | | NO | 195(66.8) | 284(97.3) | |
| | | I DON'T KNOW | 35(12) | 1(0.3) | |
| 2 | If No to question 1: As soon as is available, will you take the vaccine? | YES | 216(93.9) | 93(32.7) | 0.000 |
| | | NO | 14(6.1) | 152(53.5) | |
| | | I DON'T KNOW | 0(0) | 39(13.7) | |
| 3 | How will you persuade/discourage your loved ones or fellow students to take the vaccine | Persuade | 225(77.1) | 132(45.2) | 0.144 |
| | | Not sure | 57(19.5) | 113(38.7) | |
| | | Discourage | 10(3.4) | 47(16.1) | |

Table 4. Supplemental Finding

| Serial Number | Items | Response | Hepatitis B | Coronavirus |
|---------------|--|--|-------------|-------------|
| 1 | List the beliefs | Nigerians are so strong to be killed by the disease | 0(0) | 62(21) |
| | | Not in existence | 0(0) | 21(7.2) |
| | | It is a problem orchestrated by world power to manipulate the world for their selfish gain | 0(0) | 3(1.0) |
| | | It is political thing | 0(0) | 73(25.0) |
| | | It is fake | 0(0) | 11(3.8) |
| | | Might not be deadly | 0(0) | 15(5.1) |
| 2 | In short statement state your reasons for not willing to take Hepatitis B /coronavirus vaccine | I do not trust the government | 0(0) | 30(19.70) |
| | | Not convinced about the vaccine | 0(0) | 4(2.6) |
| | | It has to be proven safe | 0(0) | 63(41.4) |
| | | I am not sure the vaccine effective | 5(35.7) | 13(8.6) |
| | | Scared of the rumoured side effect | 0(0) | 45(29.6) |

4. Discussion

Vaccine confidence is increasingly becoming one of the important elements in determining vaccination status especially in regions where vaccine accessibility is optimal. In many studies hepatitis B vaccine has adequate acceptance by the students of health sciences although no such study is available in our school. Many studies have pointed out that vaccine confidence is vaccine dependent. One vaccine may enjoy the acceptance of a population while another vaccine is rejected in the same population. The determinants of these diverse attitude are dynamic and population dependent, hence the intense study in this area. Vaccine confidence is a new phenomenon that is yet to be captured by many undergraduate curriculums. These concepts according to WHO and other relevant institutions should not only gain popularity but should be measured and systematic surveillance put in place for monitoring at all levels. This study compared the attitudes of students in the health sciences toward hepatitis B vaccine and the coronavirus vaccines.

The first section of the study that assessed the general knowledge on vaccine showed that the students had good knowledge of vaccine. This observation is expected among health science student since their curriculums contain topics and courses on infectious disease prevention and vaccination [20]. In most studies among medical students, their knowledge of the use of vaccine for prevention of common vaccine preventable diseases is optimal [21,22]. For instance in a study on the knowledge of hepatitis B among students in Enugu, Nigeria, shows that 99.2% of the students had good knowledge about the disease and its prevention. In the study the knowledge of the health science students was significantly better when compared with the student of business administration in the same school [22].

Hepatitis B vaccine is an important requirement of all health science students and most available studies showed good attitude of students toward the vaccine [23,24]. This exceptional attitude about hepatitis B vaccine in the population informed the bases of comparison with coronavirus vaccine in this study. For coronavirus therefore, the respondents express significant negative attitude than hepatitis B vaccine in all the questions except for 'efficacy' of the vaccines. Many studies have pointed out that the major element of unbelief as regards vaccine

is the aspect of efficacy especially in the developing countries where the vaccine preventing diseases are still rampaging in high proportion owing to poor handling practices and unpredicted complex interaction between vaccine and the host [24,25]. Sometimes is difficult to communicate to the public that their 100% anticipated vaccine efficacy is not realistic considering the dynamic relationship between vaccine, host, and the infectious agents [26,27,28]. Such interactions have been extensively studied and have to do with the heterogenous nature of the host immune response [29]. The time is now to find the means of passing this unfamiliar phenomenon to the public since information about vaccine could either strengthen or weaken the consumer's confidence.

In this era of diverse opinion and hoax, the WHO and other vaccine related agencies have observed that misinformation and lack of access to balanced and accurate information is a major contributor to low vaccine confidence [29-33]. The impact of such misinformation has led to delay in elimination of wild poliovirus in the Northern parts of the countries. These opinions emanate from non-health agency such as the media, social leaders; political and religious, who are influential in the society. For instance, in the case of the polio vaccine in the Northern States, their religious leaders and their local media were cardinal custodians and propagators of antivaccine information during the period [34]. This study also seeks to know the level of trust the participants have for the Doctors, media, political and religious leader concerning the two vaccines; it was observed that the students trust them concerning the hepatitis B than coronavirus. Who should be trusted as regards vaccine and other important health related information in the era of web wide world? The misinformation of salt water use in Nigeria during Ebola outbreak in 2014 is still fresh at mind [35]. The morbidity and mortality that followed as result of that singular act was enamous [35]. The identification and educating those important opinion peddlers are necessary to ensure the dissemination of correct information. There is need to emphasis on single information source when it comes to vaccine relate issues.

From this study, most of the students had not been vaccinated of hepatitis B despite their willingness. The reason most of they gave unavailability of the vaccine and the cost of vaccine. Hepatitis B vaccine is not free in many states for the at risk population such as the health workers

in many states of Nigeria. The cost according to most studies is high and cannot be afforded by a student [36,37]. Some studies recommended that it should be made free and available in all tertiary institutions across the country [36,37,38]. At the time of this study coronavirus vaccine was just approved for mass vaccination in the country, but from this study over half of the participants were not willing to take the vaccine. This finding is similar to most studies done the region [6]. Many students expressed concern on the efficacy, safe, and the likely side effect of the vaccine. There is need to carryout serious campaign to convince the public on the vaccine potency and safe, and that the vaccine passed through the necessary processes before approval. Such concerns were not reported for hepatitis B vaccine.

The myths and superstitions expressed by the coronavirus were not different from what were observed by reviewed studies [6,7,39]. There is need to identify these wrong believe and counter them before they become an ideology that will be difficult erase from the population.

5. Limitation

As with all cross-sectional studies, we can only describe the response of the student during the period of the study; we cannot assess their confidence before the Covid-19 epidemic. We did not collect information about the source of their knowledge on the questions in the questionnaire. We did not also include questions to assess their reasons if they've had any ugly experience about Hepatitis B and Covid-19, which could explain their responses. We believe that the findings in this study will inform and strengthen further studies in this area.

6. Conclusion

The students expressed adequate knowledge on vaccines generally. There was negative attitude on Covid-19 vaccine than Hepatitis B vaccine. For the two vaccines they expressed concern on the effectiveness of the vaccines. Majority of the students have not had hepatitis B vaccine despite their willingness. It was observed that the students who expressed unwillingness to take the Covid -19 vaccine were concerned about the side effect, efficacy, and safety. Some of the myths highlighted by the respondents were 'Nigerians are so strong to be killed by Covid-19, Covid -19 is political, etc. it is therefore important to add the concept of vaccine confidence and hesitancy in the curriculum of the health science students and to increase the awareness on the efficacy of vaccines among health science students. Hepatitis B and Covid-19 vaccine should be made available for the students in health sciences in the States.

Ethics Approval and Consent to Participate

Ethical clearance was obtained from the ethical committee of Enugu State teaching Hospital. The purpose

and objective of the study were explained to the respondents. Then, verbal consent was taken from each participant after clearly explaining the purpose of the study.

Consent for Publication

Not applicable.

Availability of Data and Material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing Interests

The authors declare that they have no competing interests.

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Authors' Contributions

NCC supported the study design, led the analysis and drafted the paper; ONS participated in the data collection and helped with analysis; OCP participated in the data collection and helped with analysis; AEC participated in data collection, analysis; IOE assisted in analysis and reviewed the draft paper; All authors read and approved the final manuscript.

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References

- [1] WHO: Coronavirus disease (Covid-19) vaccine update; 19 February 2021.
- [2] CDC: Ensuring COVID-19 Vaccine Safety in the US, Feb. 15, 2021 <https://www.cdc.gov/coronavirus/2019-ncov/vaccines/safety.html>.
- [3] <https://www.afro.who.int/news/covax-expects-start-sending-millions-covid-19-vaccines-africa-february>.
- [4] Olusola-Makinde OO, Makinde OS. COVID-19 incidence and mortality in Nigeria: gender based analysis. PeerJ. 2021 Feb 12;9:e10613.
- [5] Faisal S. Nigeria: accelerated covid-19 vaccines introduction and deployment plan; S Faisal – January, 2021 - ngfrepository.org.ng.
- [6] Chiedozi AP, Chukwuebuka OJ, Chidimma CF, Onyinyechi OV, Chijioke AK, Chibuzor OS, Gabriel OC, Chioma UB. Willingness to Accept a Potential COVID-19 Vaccine in Nigeria. American Journal of Medical Sciences. 2021; 9(1): 1-5.

- [7] Sallam M. COVID-19 Vaccine Hesitancy Worldwide: A Concise Systematic Review of Vaccine Acceptance Rates. *Vaccines*. 2021 Feb; 9(2): 160.
- [8] Olomofe CO, Soyemi VK, Udomah BF, Owolabi AO, Ajumuka EE, Igbokwe CM, Ashaolu UO, Adeyemi AO, Aremu-Kasumu YB, Dada OF, Ochieze JC. PREDICTORS OF UPTAKE OF A POTENTIAL COVID-19 VACCINE AMONG NIGERIAN ADULTS. medRxiv. 2021 Jan 1: 2020-12.
- [9] Taylor S, Khan M, Muhammad A, Akpala O, van Strien M, Morry C, Feek W, Ogden E. Understanding vaccine hesitancy in polio eradication in northern Nigeria. *Vaccine*. 2017 Nov 7; 35(47): 6438-43.
- [10] Umeh GC, Nomhwange TI, Shamang AF, Zakari F, Musa AI, Dogo PM, Gugong V, Iliyasu N. Attitude and subjective wellbeing of non-compliant mothers to childhood oral polio vaccine supplemental immunization in Northern Nigeria. *BMC public health*. 2018 Dec; 18(1): 1-7.
- [11] Nwanggwu CN, Amadi EC, Imanyikwa OEI. Cross-sectional Survey on Parental Perception and Attitude on Measles Vaccine: Low Hospital Measles Case Presentation in Rural Area in Enugu, Nigeria. 2021 FEB; 15(2): EC14.
- [12] Adenlewo OJ, Adeosun PO, Fatusi OA. Medical and dental students' attitude and practice of prevention strategies against hepatitis B virus infection in a Nigerian university. *Pan African Medical Journal*. 2017; 28(1).
- [13] Arora VM, Chivu M, Schram A, Meltzer D. Implementing physical distancing in the hospital: a key strategy to prevent nosocomial transmission of COVID-19. *J Hosp Med*. 2020 May 1; 15(5): 290-1.
- [14] Hepatitis B Vaccination: Information for Healthcare Providers. <https://www.cdc.gov/vaccines/vpd/hepb/hcp/index.html>.
- [15] Ogawa M, Akine D, Sasahara T. Comparison of hepatitis B vaccine efficacy in Japanese students: a retrospective study. *Environmental health and preventive medicine*. 2019 Dec; 24(1): 1-6.
- [16] Coppeta L, Pompei A, Balbi O, De Zordo LM, Mormone F, Policardo S, Lieto P, Pietrouisti A, Magrini A. Persistence of immunity for hepatitis B virus among healthcare workers and Italian medical students 20 years after vaccination. *International journal of environmental research and public health*. 2019 Jan; 16(9): 1515.
- [17] Opel DJ, Mangione-Smith R, Taylor JA, Korfiatis C, Wiese C, Catz S, Martin DP. Development of a survey to identify vaccine-hesitant parents: the parent attitudes about childhood vaccines survey. *Human vaccines*. 2011 Apr 1; 7(4): 419-25.
- [18] Opel DJ, Taylor JA, Zhou C, Catz S, Myaing M, Mangione-Smith R. The relationship between parent attitudes about childhood vaccines survey scores and future child immunization status: a validation study. *JAMA pediatrics*. 2013 Nov 1; 167(11):1065-71. <https://www.medscape.com/medicalstudents/resource>.
- [19] <https://www.medscape.com/medicalstudents/resource>.
- [20] Larson HJ, Schulz WS, Tucker JD, Smith DM. Measuring vaccine confidence: introducing a global vaccine confidence index. *PLoS currents*. 2015 Feb 25; 7. <https://www.medscape.com/medicalstudents/resource>.
- [21] Demsiss W, Seid A, Fiseha T. Hepatitis B and C: Seroprevalence, knowledge, practice and associated factors among medicine and health science students in Northeast Ethiopia. *PLoS One*. 2018 May 15; 13(5): e0196539.
- [22] Amorha KC, Chiebue MI, Ayogu EE, Ukoha-Kalu OB, Okonta MJ. Knowledge, Attitudes and Practice of Undergraduate Students in University of Nigeria Enugu campus (UNEC) towards Hepatitis B. *Journal of Pharmacy and Biological Sciences*. 2017; 12(3): 66-71.
- [23] Pathoumthong K, Khampanisong P, Quet F, Latthaphasavang V, Souvong V, Buisson Y. Vaccination status, knowledge and awareness towards hepatitis B among students of health professions in Vientiane, Lao PDR. *Vaccine*. 2014 Sep 3; 32(39): 4993-9.
- [24] Larson HJ, De Figueiredo A, Xiaohong Z, Schulz WS, Verger P, Johnston IG, Cook AR, Jones NS. The state of vaccine confidence 2016: global insights through a 67-country survey. *EBioMedicine*. 2016 Oct 1; 12: 295-301.
- [25] Centers for Disease Control and Prevention. Provider's Role: importance of Vaccine Administration and Vaccine Storage & Handling. 2019 [accessed 2019 Oct 21]. <https://www.cdc.gov/vaccines/hcp/admin/storage/providers-role-vacc-admin-storage.html>. [Google Scholar].
- [26] Kennedy A, Glasser J, Covello V, Gust D. Development of vaccine risk communication messages using risk comparisons and mathematical modeling. *J Health Commun*. 2008; 13: 793-807.
- [27] World Health Organization. Vaccination and trust. How concerns arise and the role of communication in mitigating crises. 2013 [accessed 2019 Oct 21]. http://www.euro.who.int/__data/assets/pdf_file/0004/329647/Vaccines-and-trust.PDF. [Google Scholar]
- [28] World Health Organization. Vaccine Safety Events: managing the communications response. 2013 [accessed 2019 Oct 21]. http://www.euro.who.int/__data/assets/pdf_file/0007/187171/Vaccine-Safety-Events-managing-the-communications-response.pdf. [Google Scholar]
- [29] Badur S, Ota M, Öztürk S, Adegbola R, Dutta A. Vaccine confidence: The keys to restoring trust. *Human vaccines & immunotherapeutics*. 2020 May 3; 16(5):1007-17.
- [30] United Nations International Children's Emergency Fund. Tracking anti-vaccination sentiment in eastern European social media networks. 2013 [accessed 2019 Oct 21]. <https://www.unicef.org/eca/reports/tracking-anti-vaccination-sentiment-eastern-european-social-media-networks>. [Google Scholar].
- [31] Dubé E, Vivion M, MacDonald NE. Vaccine hesitancy, vaccine refusal and the anti-vaccine movement: influence, impact and implications. *Expert review of vaccines*. 2015 Jan 2; 14(1): 99-117.
- [32] Zimmerman R, Wolfe R, Fox D, Fox J, Nowalk M, Troy J, Sharp L. Vaccine criticism on the World Wide Web. *J Med Internet Res*. 2005; 7: e17. [Crossref], [PubMed], [Web of Science ®], [Google Scholar].
- [33] Ghinai I, Willott C, Dadari I, Larson H. Listening to the rumours: what the northern Nigeria polio vaccine boycott can tell us ten years on. *Glob Public Health*. 2013; 8: 1138-50.
- [34] Obadare E. A crisis of trust: history, politics, religion and the polio controversy in Northern Nigeria. *Patterns of Prejudice*. 2005 Sep 1; 39(3): 265-84.
- [35] Balami AD, Meleh HU. Misinformation on salt water use among Nigerians during 2014 Ebola outbreak and the role of social media. *Asian Pacific Journal of Tropical Medicine*. 2019 Apr 1; 12(4): 175.
- [36] Adenlewo OJ, Adeosun PO, Fatusi OA. Medical and dental students' attitude and practice of prevention strategies against hepatitis B virus infection in a Nigerian university. *Pan African Medical Journal*. 2017; 28(1).
- [37] Ejembi J, Muktar H, Jimoh O, Ibrahim MS, Ibrahim A, Giwa F, Olayinka A. Hepatitis B vaccination status among medical students at a tertiary institution in North-East Nigeria. *International Journal of Infectious Diseases*. 2020 Dec 1; 101: 526-7.
- [38] Kana MA, Omole NV, Nmadu AG, Joshua IA, Muhammad-Idris ZK. Hepatitis B and C: an assessment of risk exposure and prevalence among preclinical medical students in Northwestern Nigeria. *Nigerian Journal of Medicine*. 2020 May 5; 29(1): 62-8.
- [39] Eniade OD, Olarinmoye A, Otovwe A, Akintunde FE, Okedare OO, Aniyeloye AO. Willingness to Accept COVID-19 Vaccine and Its Determinants among Nigeria Citizens: A Web-based Cross-sectional Study. *Journal of Advances in Medicine and Medical Research*. 2021 Apr 3: 13-22.

Questionnaire

Section A: Biodata

1. Sex: Male....., Female.....
2. Age: < 15....., 15-20....., 21-25.....,26-30.....,>30.....
3. Marital Status: Single....., Married....., Divorced.....
4. Department:
5. Religion: Roman Catholic:Protestant: Muslim: Traditional:

Section B: General Question on Vaccines

(kindly tick T for True, F for False or D don't know)

| Serial Number | Items | Responses |
|---------------|---|--------------------------|
| | | TRUE/FALSE/ I DON'T KNOW |
| 1 | Vaccines are drugs | |
| 2 | Vaccines are poison | |
| 3 | Vaccines are dead microorganisms | |
| 4 | Vaccines are live microorganisms | |
| 5 | Vaccines are part of microorganisms | |
| 6 | Vaccines are manufactured by the pharmaceutical company | |
| 7 | Vaccines are manufactured by the medical laboratories | |
| 8 | Vaccines are manufactured by the hospitals | |
| 9 | Vaccines are manufactured by the universities | |
| 10 | Upon discovery of vaccine, it is approved by the pharmaceutical companies | |
| 11 | Upon discovery of vaccine, it is approved by the regulatory bodies | |
| 12 | Upon discovery of vaccine, it is approved by the politicians | |
| 13 | Upon discovery of vaccine, it is approved by the hospitals | |
| 14 | Upon discovery of vaccine for a particular disease, the "safe" of the vaccine will be considered before approval by the appropriate organizations. | |
| 15 | Upon discovery of vaccine for a particular disease, the "effectiveness" of the vaccine will be considered before approval by the appropriate organizations. | |
| 16 | Upon discovery of vaccine for a particular disease, the "cost" of the vaccine will be considered before approval by the appropriate organizations | |
| 17 | The common route of vaccine administration is oral | |
| 18 | The common route of vaccine administration is muscular | |
| 19 | The common route of vaccine administration is intravenous | |
| 20 | Vaccines are used for prevention of diseases | |
| 21 | Vaccines are used for treatment of diseases | |
| 22 | Vaccines are used for reduction of disease | |
| 23 | Vaccines are used for curing of disease | |
| 24 | Vaccines are administered to children only | |
| 25 | Vaccines are administered to adult only | |
| 26 | Vaccines are administered to exposed population only | |
| 27 | Vaccines are administered to at risk population | |
| 28 | Vaccines are specific for a particular disease. | |
| 29 | One type of vaccine can protect against many diseases | |

Section C: Vaccine attitude for Hepatitis B

1. Have you ever decided not to have hepatitis B vaccine?
 - A. Yes
 - B. No
 - C. I don't know
2. In the scale of 1-10, how sure are you that hepatitis B vaccine recommendation is a good idea for the people?

0....1....2....3....4....5....6....7....8....9....10....
3. Is it better to develop immunity by getting hepatitis B than to get a vaccine?
 - A. Strongly agreed
 - B. Agreed
 - C. Not sure
 - D. Disagreed
 - E. Strongly disagreed

4. hepatitis B vaccine is effective.
 - A. Strongly agreed
 - B. Agreed
 - C. Not sure
 - D. Disagreed
 - E. Strongly disagreed
5. hepatitis B vaccine is important for me
 - A. Strongly agreed
 - B. Agreed
 - C. Not sure
 - D. Disagreed
 - E. Strongly disagreed
6. How concerned are you that you might have serious side effect from the hepatitis B vaccine
 - A. strongly concerned
 - B. Concerned
 - C. Not sure
 - D. Not concerned
 - E. Strongly not concerned
7. How concerned are you that the vaccine might not be safe
 - A. strongly concerned
 - B. Concerned
 - C. Not sure
 - D. Not concerned
 - E. Strongly not concerned
8. I am able to openly discuss my concern about hepatitis B vaccine with my doctor
 - a. Yes
 - b. No
 - c. I don't know
9. All things considered, how much do you trust your doctors concerning hepatitis B vaccine

0....1....2....3....4....5....6....7....8....9....10....
10. All things considered, how much do you trust your government concerning the hepatitis B vaccine

0....1....2....3....4....5....6....7....8....9....10....
11. All things considered how much do you trust your priest/pastor/Iman concerning hepatitis B vaccine

0....1....2....3....4....5....6....7....8....9....10....
12. All things considered, how much do you trust the media concerning hepatitis B vaccine

0....1....2....3....4....5....6....7....8....9....10....
13. List the myths/ superstition concerning the hepatitis B

.....

Section D: Other questions on attitude for Hepatitis B

1. Have you taken hepatitis B vaccine Yes.....No.....,I don't know.....
 - a. If No; As soon as is available will you take the vaccine Yes... No....., I don't know
 - b. In short statement state your reasons.....
2. How will you persuade/discourage your loved ones or fellow students to take the vaccine
 - a. Strongly persuade.
 - b. Persuade
 - c. Not sure
 - d. Discourage
 - e. Strongly discourage.

Section E: Vaccine attitude for Covid-19

1. Have you ever decided not to have coronavirus vaccine?
 - A. Yes
 - B. No
 - C. I don't know
2. In the scale of 1-10, how sure are you that coronavirus vaccine recommendation is a good idea for the people?

0....1....2....3....4....5....6....7....8....9....10....
3. Is it better to develop immunity by getting covid-19 than to get a vaccine?
 - A. Strongly agreed
 - B. Agreed
 - C. Not sure

- D. Disagreed
- E. Strongly disagreed
- 4. Coronavirus vaccine is effective
 - A. Strongly agreed
 - B. Agreed
 - C. Not sure
 - D. Disagreed
 - E. Strongly disagreed
- 5. Coronavirus vaccine is important for me
 - A. Strongly agreed
 - B. Agreed
 - C. Not sure
 - D. Disagreed
 - E. Strongly disagreed
- 6. How concerned are you that you might have serious side effect from the coronavirus vaccine
 - A. strongly concerned
 - B. Concerned
 - C. Not sure
 - D. Not concerned
 - E. Strongly not concerned
- 7. How concerned are you that the vaccine might not be safe
 - A. strongly concerned
 - B. Concerned
 - C. Not sure
 - D. Not concerned
 - E. Strongly not concerned
- 8. I am able to openly discuss my concern about coronavirus vaccine with my doctor
 - Yes
 - No
 - I don't know
- 9. All things considered, how much do you trust your doctors concerning covid vaccine
 - 0....1....2....3....4....5....6....7....8....9....10....
- 10. All things considered, how much do you trust your government concerning the coronavirus vaccine
 - 0....1....2....3....4....5....6....7....8....9....10....
- 11. All things considered how much do you trust your priest/pastor/Iman concerning coronavirus vaccine
 - 0....1....2....3....4....5....6....7....8....9....10....
- 12. All things considered, how much do you trust the media concerning coronavirus vaccine
 - 0....1....2....3....4....5....6....7....8....9....10....
- 13. List the myths/ superstition concerning the covid-19 vaccine
 -

Section F: Other questions on attitude for Covid-19

- 1. Have you taken covid 19 vaccine Yes/No
 - a. If No; As soon as is available will you take the vaccine
 - b. In short statement state your reasons.....
- 2. How will you persuade/discourage your loved ones to take the vaccine
 - a. Strongly persuade.
 - b. Persuade
 - c. Not sure
 - d. Discourage
 - e. Strongly discourage.

