Acceptance of Covid-19 Vaccine Among the People of Al-Jabal Al-Akhdar District in Libya as of April 2021

Gladys N. Abrina1, Joanne Faith N. Abrina2 & Grace N. Abrina3

1Faculty of Nursing, Omar Al-Mukhtar University, Al-Bayda, Libya.
2College of Nursing and Health Sciences, Palawan State University, Puerto Princesa City, Palawan, 5300, Philippines.
3Graduate School, Palawan State University, Puerto Princesa City, Palawan, 5300, Philippines.

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ABSTRACT

Background: In the midst of the worldwide effort to control the spread of the COVID-19 thru immunization of herd immunity, there is still the doubt about the effectiveness of the vaccine. Thus, the vaccine hesitancy. This is a threat to public health. Knowing and understanding the factors that influence the COVID-19 vaccine acceptance of the community may contribute in creating new and improved strategies for a better comprehensive vaccination program. The objective of this study was to evaluate the frequency of the acceptance of COVID-19 vaccine and their determinants as of April 2021 in the Al-Jabal Al-Akhdar, Libya.

Methods: This is cross-sectional quantitative research was conducted using stratified random sampling while observing strict precautionary measures. In April 2021, guided questionnaires were answered by 2,000 respondents. Sample distribution were as follows: 500 from Al-Bayda, 200 from Shahat, 100 from Sussa, 100 from Massah, 100 from Omar Al-Mukhtar, 100 from Labraq, Mansoura, GNerda, and Gubbah 170 from Jardes and Marawa, 170 from Faydiya and Gasser Libya, 170 from Haniya and Zawiat Al-Arghab, 220 from Werdama, Sidi Abdul Wahad and Hamama, 170 from Gadul and Slanta. Results were validated and analyzed using Minitab version 17.1. Data were presented using texts and tables.

Results: Out of the 2,000 invitees, 956 expressed their willingness to take the vaccine if it is available. Interest in accepting the vaccine is relatively high among 18-25 age group (711), male (781), being married (779), with bachelor’s degree (475), employed by government (878), and with Libyan nationality (951). Upon cross-tabulation using chi-square, results showed that the proportion of the age group 18-25 (X²=870.206; p-value=0.00001), of male (X²=664.153; p-value=0.00001), of being married (X²=967.552; p-value=0.00001), of being a Libyan (X²=65.443; p-value=0.00001), of being a bachelor’s degree (X²=728.872; p-value=0.00001); and of being a government employee (X²=1007.334; p-value=0.00001) were significant factors associated vaccine acceptance. Moreover, respondent’s perception whether the COVID-19 vaccine will help prevent the spread of disease (X²=1429.099; p-value=0.00001), their trust in the health system of Libya (X²=1227.565; p-value=0.00001), their idea whether the COVID-19 vaccine has a side-effect (X²=992.959; p-value=0.00001), and their fear of the side-effects of the COVID-19 vaccine are also key determinants that predict COVID-19 vaccine acceptance.

Conclusion: Identifying key factors relating to COVID-19 vaccine acceptance may aid in intensifying the global immunization drive. Health education must be reinforced to expedite achieving herd immunity using the social media and proper health education elsewhere.

Keywords: Vaccine, Vaccine hesitancy, Vaccine acceptance, COVID-19, Coronavirus, Libya.

Methods

Study Design and Setting

This quantitative cross-sectional survey was conducted using stratified random sampling method where the participants came from the different areas of the Al-Jabal Al-Akhdar District in Libya.

Study Sample

The investigator determined the total number of sample according to the latest survey conducted by the Bureau of Statistics and Census in Libya. Al-Jabal Al-Akhdar District has a population of 250,020 as of January 2021, (https://www.libya herald.com/2021/01/22/libyas-population-was-6931061-in-2020-census-bureau/).

Using sample size calculator (https://www.checkmarket.com/sample-size-calculator/), the researcher determined their sample size with a confidence level of 95% and at around 2% margin of error. The ideal number of respondents at 2% margin of error is 2,379. Only 2,000 total respondents were included in the study. Sample
distribution were as follows: 500 from Al-Bayda, 200 from Shahat, 100 from Sussa, 100 from Massah, 100 from Omar Al-Mukhtar, 100 from Labraq, Mansoura, Gernada, and Gubbah 170 from Jardes and Marawa, 170 from Faydiya and Gasser Libya, 170 from Haniya and Zawiat Al-Argub, 220 from Werdama, Sidi Abdul Wahad and Hamama, 170 from Gandula and Slanta. Hence, the total sample is 2000. More samples were included in areas with higher population. People who can’t give response like critically-ill, those who are unable to communicate (deaf, mute, blind), people with mental problem were excluded in the study. All respondents don’t manifest any flu-like symptoms during the time of survey.

**Questionnaire Development**

After conducting a literature review, key areas were identified. Questionnaire was drafted in English, then in Arabic. Sociodemographic data, desire to take the vaccine whenever possible, perception towards COVID-19 vaccine, and their confidence on the health care system were examined. The draft questionnaire was assessed and scrutinized by the Faculty of Nursing. It underwent pilot testing. The final questionnaire was kept concise. Options were given for the sociodemographic characteristics. For the other remaining inquiry, close-ended questions were asked. The respondents were instructed to select one option from the list if responses (Yes/ No/ Not Sure).

**Ethical Consideration**

Ethical approval was obtained from the ethical review committee of Omar Al-Mukhtar University, Faculty of Nursing, and supportive letters were obtained as well. Clear communication was conducted accordingly. Informed verbal consent was obtained. Privacy and confidentiality were maintained. Participants were assured that they will never face anything for their participation. Strict health precautionary measures like the use of alcohol, face-mask and face-shields, social distancing, and limited time exposure were observed during the collection of data.

**Data Management and Analysis**

Data entry and validation were done in Minitab Version 17.1. The outcome variables of this study were to determine the acceptance of the COVID-19 vaccine among the people of Al-Jabal Al-Akhdar, Libya as of April 2021. Descriptive statistics were conducted to create summary tables for the variables. A cross-tabulation analysis was done to scrutinize the distribution of intention to take COVID-19 vaccine, their idea on the action of vaccine, their knowledge and fear of the side-effects of the vaccine, their trust in the health system of the country with the respondent’s sociodemographic profile using chi-square. A two-tailed p-value <0.05 was considered statistically significant.

**Results**

The 2,000 questionnaires were returned and were answered completely. All subjects agreed to include their answers in the study. Table 1 displays the frequency of the sociodemographic profile of the respondents. Most of the participants were within the age bracket of 18-25 which is 860 (43%). On the other hand, ages 45 and above has the least number of respondents with only 234 (11%). Male dominated the female, 1032 and 968, respectively. Around 46% (918) were married, followed by the single at around 42% (839). Only 4% (88) of the respondents are non-Libyan. 878 (43.9%) of them finished a Bachelor’s degree but only 222 (11.1%) proceeded to post-graduate
education. Majority of them are working. 1108 (55.4%) are working for the government while 484 (24.2%) are self-employed.

Table 1. Sociodemographic Profile of the Study Population (N=2000)

| Variables       | Category                  | F   | %    |
|-----------------|---------------------------|-----|------|
| Age             | 18 to 25                  | 860 | 43.00|
|                 | 26 to 35                  | 552 | 27.60|
|                 | 36 to 45                  | 354 | 17.70|
|                 | 45 and above              | 234 | 11.70|
|                 | Total                     | 2000| 100  |
| Gender          | Male                      | 1032| 51.60|
|                 | Female                    | 968 | 48.40|
|                 | Total                     | 2000| 100  |
| Marital Status  | Married                   | 918 | 45.90|
|                 | Single                    | 839 | 41.95|
|                 | Separated/Divorced/Widowed| 243 | 12.15|
|                 | Total                     | 2000| 100.00|
| Nationality     | Libyan                    | 1912| 95.60|
|                 | Non-Libyan                | 88  | 4.40 |
|                 | Total                     | 2000| 100.00|
| Education       | Diploma                   | 515 | 25.75|
|                 | Bachelor                  | 878 | 43.90|
|                 | High School               | 385 | 19.25|
|                 | Post Graduate             | 222 | 11.10|
|                 | Total                     | 2000| 100.00|
| Occupation      | Government                | 1108| 55.40|
|                 | Self Employed             | 484 | 24.20|
|                 | Not Working               | 408 | 20.40|
|                 | Total                     | 2000| 100.00|
Table 2 presents the acceptance of COVID-19 vaccine, perception, knowledge, and the proportion of people who trust the health care system of Libya. Of the 2,000 respondents, 1044 or 52.2% expressed not to take the vaccine whenever it will be available in the country. 502 (25.10%) think that vaccine will not help in preventing the spread of the disease (coronavirus) and 695 (34.75%) is not sure whether the vaccine can aid in controlling the communicability of COVID-19. Result shows that 881 (44.05%) of the interviewee don’t trust the health care system of the country. On the other hand, 780 (39%) trust the healthcare offered by the government. 46.70% of the population understand that the vaccine has side-effect, and majority of the population, 1025 (51.25%), are afraid of the side-effect/s of the vaccine.

Table 2. COVID-19 Vaccine Acceptance in Al-Jabal Al-Akhdar District of Libya (N=2,000)

| Variables                                           | Yes        | No         | Not Sure   |
|-----------------------------------------------------|------------|------------|------------|
| If the COVID-19 vaccines arrive in Libya, will you get the vaccine? | 956 (47.80%) | 1044 (52.20%) | -          |
| Do you think the COVID-19 vaccine prevents the spread of the disease? | 803 (40.15%) | 502 (25.10%) | 695 (34.75%) |
| Do you trust the health system of Libya?             | 780 (39.00%) | 881 (44.05%) | 339 (16.95%) |
| Do you think COVID-19 vaccine has side-effects?      | 934 (46.70%) | 560 (28.00%) | 506 (25.30%) |
| Are you afraid of the side-effects of the vaccines?  | 1025 (51.25%) | 465 (23.25%) | 510 (25.50%) |

Table 3 illustrates the cross-tabulation of the profile of the subjects and their intent to accept the COVID-19 vaccine. Result states that from the 956 respondents who accepts the vaccine, majority (711) belongs to 18-25 age group while 234 out of 234 respondents who are 46 and above are hesitant to take the vaccine: with $X^2=870.206$ and p-value of 0.00001, there is significant relationship among variables. Greater fraction male (781 out of 1032) are more likely to accept the vaccine than female (175 out of 968): with $X^2=664.153$ and p-value of 0.00001, there is significant relationship among variables. Participants who were married (779 out of 918) are also more inclined to take the vaccine. On the contrary, the separated/widowed/divorced show extreme hesitancy on the vaccine (234 out of 234) with $X^2=967.552$ and p-value of 0.00001, there is significant relationship among variables. Larger proportion of Libyans (951 out of 1912) accept the vaccine compared to the non-Libyans (5 out of 88) with $X^2=65.443$ and p-value of 0.00001, there is significant relationship among variables. Out of the 878 bachelor’s degree holder, 475 are willing to be vaccinated while A huge proportion of diploma graduates (442 out of 515) would subject themselves to vaccination: $X^2=728.872$ and
p-value of 0.00001, there is significant relationship among variables. Government employees have also higher chances of taking the vaccine (878 out of 1108) as opposed to the unemployed which shows zero (0 out of 408) acceptance of the vaccine, with $X^2=1007.334$ and p-value of 0.00001, there is significant relationship among variables.

Table 3. Cross-Tabulation between Sociodemographic Profile and intent to take the COVID-19 Vaccine (N=2000)

| Variables               | Category         | Yes | No  | All | Chi-Square ($X^2$) | p-value |
|-------------------------|------------------|-----|-----|-----|--------------------|---------|
| **Age**                 | 18 to 25         | 711 | 149 | 860 | 870.206            | 0.00001 |
|                         | 26 to 35         | 215 | 337 | 552 |                     |         |
|                         | 36 to 45         | 30  | 324 | 354 |                     |         |
|                         | 46 and above     | 0   | 234 | 234 |                     |         |
| Total                   |                  | 956 | 1044| 2000|                    |         |
| **Gender**              | Male             | 781 | 251 | 1032| 664.153            | 0.00001 |
|                         | Female           | 175 | 793 | 968 |                     |         |
| Total                   |                  | 956 | 1044| 2000|                    |         |
| **Marital Status**      | Married          | 779 | 139 | 918 | 967.552            | 0.00001 |
|                         | Single           | 177 | 662 | 839 |                     |         |
|                         | Separated/Divorced | 0 | 243 | 243 |                     |         |
|                         | /Widowed         |     | 243 |     |                     |         |
| Total                   |                  | 956 | 1044| 2000|                    |         |
| **Nationality**         | Libyan           | 951 | 961 | 1912| 65.443             | 0.00001 |
|                         | Non-Libyan       | 5   | 83  | 88  |                     |         |
| Total                   |                  | 956 | 1044| 2000|                    |         |
| **Education**           | Diploma          | 442 | 73  | 515 | 728.872            | 0.00001 |

Degree of Freedom = 3

Degree of Freedom = 1

Degree of Freedom = 2

Degree of Freedom = 1
Table 4 presents the cross-tabulation of the intent to take the vaccine and their perception on the vaccine and their trust on the health care delivery system of Libya. Among those who accept the vaccine, majority (738 out of 956) believes that vaccine will help in preventing the spread of the disease, with $X^2=1429.099$ and p-value of 0.00001, there is a significant relationship between variables. The table show that out of 881 respondents who don’t trust the health care system of Libya, 689 wouldn’t want to take the vaccine. On the contrary, from the 780 who trust the health care system of Libya, 763 conveyed their acceptance of the vaccine, with $X^2=1327.565$ and p-value of 0.00001, there is significant relationship among variables. From the 934 subject who thinks that the vaccine has side-effect, 788 also agreed to be vaccinated. 412 (out of 560 who don’t know about the side-effect of the vaccine), and 486 (out of the 506 who are not sure about the side-effect of the vaccine) stated that they will not be taking the vaccine when it is available. With $X^2=992.959$ and p-value of 0.00001, there is significant relationship among variables. Out of the 1025 who are afraid to take the vaccine, 768 accept the vaccine. Among the 465 who are not scared of taking the vaccine, only 157 said that they will receive the vaccine while from the 510 who don’t have idea if they fear the vaccine, 479 also conveyed that they don’t want to be vaccinated. With $X^2=694.797$ and p-value of 0.00001, there is significant relationship among variables.

Table 4. Cross Tabulation with Intent to Take the Vaccine and Other Determinants (N=2,000)

| Occupation            | Yes   | No   | All  | Chi-Square ($X^2$) | p-value |
|-----------------------|-------|------|------|--------------------|---------|
| Bachelor              | 475   | 403  | 878  |                    |         |
| High School           | 24    | 361  | 385  |                    |         |
| Post Graduate         | 15    | 207  | 222  |                    |         |
| Total                 | 956   | 1044 | 2000 |                    |         |

Degree of Freedom = 3

| Occupation            | Government | Self Employed | Not Working | Total  | Chi-Square ($X^2$) | p-value |
|-----------------------|------------|---------------|-------------|--------|--------------------|---------|
| Government            | 878        | 230           | 1108        |        | 1007.334           | 0.00001 |
| Self Employed         | 78         | 406           | 484         |        |                    |         |
| Not Working           | 0          | 408           | 408         |        |                    |         |
| Total                 | 956        | 1044          | 2000        |        |                    |         |

Degree of Freedom = 2

| Variables                                                                 |
|---------------------------------------------------------------------------|
| Do you think the COVID-19 vaccine prevents the spread of the disease?     |

| Do you think the COVID-19 vaccine prevents the spread of the disease?     |
|---------------------------------------------------------------------------|
| Yes | No | I don’t Know |
|-----|----|--------------|
| 783 | 20 | 15           |
| 158 | 344| 680          |
| 1429.099 | 695 | 502          |

1. Degree of Freedom = 3
2. Degree of Freedom = 2

Table 4. Cross Tabulation with Intent to Take the Vaccine and Other Determinants (N=2,000)
Do you trust the health system of Libya?

|       | Yes | No | I don’t Know | Total |
|-------|-----|----|-------------|-------|
| Agree | 763 | 192| 1           | 956   |
| Disagree | 17 | 689| 338         | 1054  |

Degree of Freedom = 1

Do you think COVID-19 vaccine has side-effects?

|       | Yes | No | I don’t Know | Total |
|-------|-----|----|-------------|-------|
| Agree | 788 | 148| 20          | 956   |
| Disagree | 146 | 412| 486         | 1044  |

Degree of Freedom = 1

Are you afraid of the side-effects of the vaccines?

|       | Yes | No | I don’t Know | Total |
|-------|-----|----|-------------|-------|
| Agree | 768 | 157| 31          | 956   |
| Disagree | 257 | 308| 479         | 1044  |

Degree of Freedom = 1

Discussion

Vaccination is known to be one of the, if not the, best public health discovery in this century. Nonetheless, its acceptance or rejection vary with geography, time, social status, ethnicity, and beliefs and tradition.\textsuperscript{17,18,29} Our investigation is the first community-based study under a highly restricted atmosphere. Out of the 2,000 study participants, 1044 (52.2\%) said “No” to take the COVID-19 vaccine, and 956 (47.8\%) said “Yes” to uptake the COVID-19 vaccine.

In connection with this, being 18-25(X^2=870.206; p-value= 0.00001), male(X^2=664.153; p-value= 0.00001), married(X^2=967.552; p-value= 0.00001), Libyan(X^2=65.443; p-value= 0.00001), bachelor’s degree holder(X^2=728.872; p-value=0.00001), government employee(X^2=1007.334; p-value= 0.00001) were found to be significant predictors in explaining acceptancy of COVID-19 vaccine.

The result of our study is opposing the outcome of previous similar studies that was conducted in China, United States, and Saudi Arabia.\textsuperscript{16,27,28} 64.7\% of the study participants in Saudi Arabia expressed their willingness to take...
the COVID-19 vaccine. In our study, only 956 out of 2,000 or 47.8% of the subjects conveyed their interest in the uptake of COVID-19 vaccine. Qualitative comparisons can be done with the same studies for H1N1 Influenza A vaccine where the acceptance rate is between % and 67%. United Kingdom showed a 56.1% rate of H1N1 Influenza A vaccine acceptance. China and Hong Kong both reported an acceptance rate of 59.5%. The acceptance rate was 64% in the United States. In previous systematic reviews, there was no consistent association with the respondent’s sociodemographic profile, specifically the age and gender. On the other hand, our study revealed that age group 18-25, male, married, Libyans with bachelor’s degree, and government-employed are more likely to take the vaccine that their counterparts.

Perceived risk of being infected is one of the predictors of vaccine acceptance. More than half of our study participants, 1025 out of 2,000 or 51.25%, are afraid of the side-effect of the vaccine. Nonetheless, they are more likely to take the COVID-19 vaccine. Studies have shown that a higher trust in the health system is linked with consumption of the health services like vaccination. In our study, only 39% (780) trust the health system of the country. 881 (44.05%) don’t trust the health care system of the country, and 689 of them don’t want to be vaccinated with COVID-19 vaccine. This makes trust in the health system a significant factor of COVID-19 vaccine acceptance (p-value= 0.00001).

Our study has several limitations; firstly, it presents a picture of the community response at one point of the study. Thus, it is cross-sectional. We questioned the group being studied to state their intention to take the COVID-19 vaccine if it is available in the country. A considerable number (52.20%) responded “No”. Their answers could be different when vaccine is actually available. Moreover, their intention to take the vaccine could also change over time. Secondly, our study did not explore the reason behind acceptance or the barriers behind the hesitancy of the COVID-19 vaccine. Our questions did not explore the respondent’s knowledge of COVID-19, the vaccine’s actions and side-effects, their expectations on the vaccine, as well as the reason/s for not trusting the health care system of the country. Even if there are limitations in our study, and even if it was done in a highly strict environment, it is the first of its kind in this area of Libya since the declaration of pandemic in March 2020. It is timely and relevant. Later on, we will explore new research inquiries including vaccine promotion strategies, vaccine safety, vaccine referral and its cost. We will further investigate the key motivation and barriers towards COVID-19 vaccination.

Conclusion and Recommendation

This is the first community-based study that assessed the society’s willingness to accept the COVID-19 vaccine with a representative sample even under strict health protocols. The a little over than half of the respondents do not have the intention to take the vaccine as previously presented in the results. Participant’s sociodemographic profile (age, gender, marital status, nationality, educational attainment, and occupation,) perceived risk, fear, and trust in the health care system of the country were found to be significant predictors of vaccine acceptance or rejection in Al-Jabal Al-Akhdar District in Libya. The older population, the female group, the single, and the unemployed
counted for higher ratio of the COVID-19 vaccine hesitancy. Most of the respondents who said “no” to the vaccine don’t think that the vaccine can aid in preventing the spread of the disease/virus. Vaccine hesitancy is also parallel to the high number who doesn’t trust the health system of the country. It is noted that there is higher number of respondents who are afraid to take the vaccine. Health education targeting various sociodemographic clusters should be prioritized to intensify vaccine uptake in the country, and elsewhere. Moreover, advertising the benefits of the vaccine outweighing the risk for taking it must be conveyed continuously to alleviate fear. The health care system, in collaboration with the government, should also gain public trust through their efficient and safe performance of duty. Further study should be made in order to verify our findings and to implement health promotion and interventions accordingly.

**Declarations**

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**Competing Interests Statement**

The authors declare no competing financial, professional and personal interests.

**Consent for publication**

We declare that we consented for the publication of this research work.

**Ethical Approval**

Ethical approval was obtained from the ethical review committee of Faculty of Nursing, Omar Al-Mukhtar University and supportive letters were obtained as well.

**Availability of data and material**

Authors are willing to share data and material according to the relevant needs.

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