

## Beliefs and Barriers Associated with COVID-19 Vaccinations among a Sample of Egyptian Adults in Cairo, Egypt

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### Abstract:

**Background:** During the COVID-19 pandemic, understanding vaccine hesitancy is becoming increasingly important as governments around the world struggle to convince some of the population to participate in immune protocols. **Objectives:** To calculate the percentage of COVID-19 vaccine hesitancy, and to assess the beliefs and the barriers toward COVID-19 vaccines among a sample of Egyptian adults in Cairo. **Methods:** A Cross-sectional study was conducted among adults aged 18 years old or more from both genders. A convenience sample of 289 adult Egyptians were included in the study by sending an anonymous Arabic online self-administered questionnaire. The questionnaire was divided into three sections: sociodemographic characteristics, beliefs towards COVID-19 vaccinations, and the barriers which prevented vaccinations. **Results:** The participants' mean age was  $36.1 \pm 11.36$ . Among the participants, 59.5% were females and 65.7% were married. The percentage of vaccine hesitancy was 26.3% in the studied sample. Educational level, occupation, and previous infection with COVID-19 were significantly associated with receiving COVID-19 vaccinations ( $p$  value < 0.05). The majority of vaccine refusers were concerned about side effects (67.1%), vaccine safety (53.9%), effectiveness, and long-term genetic effects of some vaccine types (51.3%). Moreover, more than half of vaccine refusers (56.6%) would accept being vaccinated if more research proved the safety and effectiveness of COVID-19 vaccination. **Conclusion:** More studies are needed to validate the safety and effectiveness of the existing vaccines and thus vaccine adoption among the general population can be raised.

**Keywords:** Attitudes, Egypt, Immunization, Obstacles, Vaccine hesitancy.

### Introduction:

The term “vaccine hesitancy” means to delay acceptance or refusal of vaccination although the vaccine is available, there is no demand for the available vaccines. It ranges from those who accept the vaccines without a doubt to complete refusal without a doubt.<sup>(1)</sup>

Vaccine hesitancy can affect individuals and consequently the whole community.<sup>(2)</sup> There are many factors contributing to

vaccine hesitancy which are related to one's environment, time, place of residency, and vaccines themselves. It has a relation with factors as complacency, convenience, and confidence.

Complacency means a low perception of disease risk; therefore, vaccination is meaningless. Confidence means having trust in vaccines regarding their safety, effectiveness, and competence in the healthcare systems. Convenience includes

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availability, affordability, and delivery of vaccines.<sup>(3)</sup>

Many COVID-19 vaccination studies have documented an association between some of these factors and the acceptance to receive the COVID-19 vaccine. The World Health Organization considers vaccine hesitancy an important threat to global health, as the COVID-19 vaccine acceptance rates varied all over the world.<sup>(4)</sup>

According to a recent global report on COVID-19 vaccine acceptance, it was revealed that nearly about 30% of the participants would hesitate to take a COVID-19 vaccine when it is available.<sup>(5)</sup> The Middle East represents a region with the lowest rates of vaccine acceptance at the global level.<sup>(4)</sup>

Compliance of humans with keeping a social distance and using face masks for long periods is unguaranteed. Therefore, the best strategy to control this epidemic is to develop an effective vaccine. A tremendous effort has been made since the discovery of the SARS-CoV-2 virus and its genome.

The Research has contributed to the development of more than 300 vaccine trial projects.<sup>(6)</sup> Recently, there are more than 40 new vaccines are undergoing clinical trial, and few of them have obtained the Emergency Use Authorization (EUA), of the Food and Drug

Administration (FDA) in many countries, as Pfizer, BioNTech, and Moderna vaccines.<sup>(7)</sup>

However, the coverage rate is an important factor that determines successful vaccination. Traditionally, the development of vaccines takes years. So, the development of a new vaccine for COVID-19 which was developed within a short period time still constitutes a high level of uncertainty for the public despite its availability.<sup>(8)</sup>

There was a variation in the acceptance rate for the vaccines previously developed to combat influenza, and this clarifies the proper understanding of the vaccine hesitancy problem regarding COVID-19.<sup>(9)</sup>

Limited research has addressed the COVID-19 vaccine acceptance rate among the population. The current study aims to calculate the percentage of COVID-19 vaccine hesitancy and to assess the beliefs and the barriers associated with COVID-19 vaccination among a sample of Egyptian adults in Cairo.

### **Subjects and Methods:**

**Study design:** A cross-sectional study was conducted.

**Study Setting:** The study was conducted in Cairo governorate.

**Study Time:** The study was conducted from February 2022 to May 2022.



**Study Population:** General population at Cairo governorate.

**Inclusion criteria:** Adults aged 18 years old or more from both genders.

**Study sample:** a convenience sample was collected.

**Sample Size:** Using the Epi info 7 programs for sample size calculation, setting the confidence level at 95% and a margin of error at 5%, it was estimated that a sample size of at least 185 persons will be needed to detect an expected prevalence rate of hesitancy to take vaccine of about 13.7%.<sup>(10)</sup>

**Tools of the study:** An Arabic anonymous online self-administered questionnaire was sent to the Egyptian adults in Cairo through social networks derived from Mubarak *et al.*, 2022 and Magadami *et al.*, 2021.<sup>(11&12)</sup>

The questionnaire was divided into three sections. The first section included the socio-demographic characteristics of the participants, such as age, gender, marital status, educational level, and occupation.

Blue-collar workers were defined as those who perform primarily physical work and whose career paths are relatively restricted<sup>(13)</sup>, while white-collar workers were defined as professional and semi-professional employees.<sup>(14)</sup>

The second section is about beliefs towards COVID-19 vaccinations such as

vaccine safety, effectiveness, and importance of vaccination. The third section assessed the potential barriers that prevent the participants from receiving the COVID-19 vaccine such as doubt in vaccine safety, doubt in vaccine effectiveness, and fear of unknown adverse effects.

**Data management:** Data was collected, cleaned, coded, entered on a personal computer, and analyzed using SPSS program version 25. Quantitative data were presented as mean and standard deviation. Qualitative data were presented as numbers and percentages. Suitable statistical tests were used as Chi-squared test, Fisher exact test, and independent t-test with a 0.05 significance level.

**Ethical Considerations:** Ethical committee approval was obtained from the ethical committee at the Faculty of Medicine at Ain Shams University. Online consent was obtained from all participants after explaining the aim and purpose of the study. Confidentiality of data and results was considered as the questionnaire was anonymous.

### Results:

A total of 289 Egyptian adults completed the questionnaire. The percentage of vaccine hesitancy was 26.3%. Among the participants, 59.5% were females, 65.7% were married, 53.3% had completed their

postgraduate education, 37.4% had completed their university education, and only 1.7% had completed their primary education.

More than half of the participants (65.1%) had a professional job. The participants ranged from 18-79 years with a mean age of  $36.1 \pm 11.36$  (Table 1).

Most of the participants (82%) don't have any chronic diseases, 76.5% never get the influenza vaccine, and 51.2% reported that they have a good health conditions. Furthermore, 36% of the respondents had COVID-19 infection without confirmation, whereas 68.2% of their close social network had confirmed COVID-19 infection.

They learned about COVID-19 vaccines information mainly from social media (70.9%). Most of the participants never attended any COVID-19 vaccinations conferences or workshops (Table 2).

Educational level and occupation were significantly associated with receiving COVID-19 vaccinations ( $p$  value  $< 0.05$ ), with non-vaccinated participants having lower education levels. The white collar was significantly receiving vaccination more than blue-collar and those who didn't work (table 1).

Moreover, previous infection with COVID-19 was associated significantly with

obtaining COVID-19 vaccinations ( $p$  value 0.005), compared to those who confirmed their infection. In addition, non-vaccinated participants used the Ministry of Health and Population (MOHP) and international organization websites as a source of information significantly less than the vaccinated group, with  $p$  value =0.03-0.003 respectively (Table 2).

Table 3 shows participants' uncertainty about the COVID-19 vaccines' safety (63%), effectiveness (62.6%), getting the vaccine is best way to avoid COVID-19 complications (41.9%), perceiving the importance of the vaccine (54.3%), perceiving the importance of getting the vaccine by everyone in the community (50.9%), being best preventive measure (41.5%), and perceiving yourself not at elevated risk to acquire Covid-19 infection (43.3%).

However, the majority agreed that more public awareness about the COVID-19 vaccine is needed (81%), that the vaccine was not tested for enough time, and that they are concerned about the vaccine's side effects (67.8%).

Otherwise, most of the participants disagreed that they had a prior bad experience with any vaccines (83.7%), and that was against vaccination in general (68.5%). In conclusion, less than half of the

participants (44.6%) showed positive beliefs toward COVID-19 vaccination.

Receiving COVID-19 vaccination was significantly higher among those who had positive beliefs towards the vaccines. Except for beliefs that the vaccine was not tested for long enough, prior bad experiences with vaccines and their adverse reactions, and perceptions that they are not at increased risk of contracting Covid-19 infection, there were significant associations between all beliefs and getting the vaccine ( $p < 0.05$ ).

The barriers to COVID-19 vaccination are listed in Table 4. Most vaccine refusers were concerned about side effects (67.1%), vaccine safety (53.9%), and effectiveness and long-term genetic effects of some vaccine types (51.3%).

Moreover, more than half of vaccine refusers (56.6%) said they would accept to get vaccinated if more research proved the safety and effectiveness of COVID-19 vaccination, and about one third if they are afraid of getting infected with COVID-19 by themselves or their family.

Being a blue-collar participant didn't know if they were infected with COVID-19, and having a negative belief toward COVID-19 vaccines were found to be more likely to be hesitant about vaccination (OR= 0.038, 0.28, 0.12) respectively as shown in table 5.

## Discussion:

Controlling the COVID-19 pandemic with its catastrophic adverse consequences of morbidities and mortalities is a must. Vaccine hesitancy should be eliminated as it is a very serious challenge and obstacle that decrease the likelihood of the immunization program's effectiveness in the elimination of the pandemic.

The percentage of vaccine hesitancy in the current study was 26.3%, which was lower than other studies conducted in Egypt by Hussein *et al*<sup>(15)</sup>, and Saied *et al*<sup>(16)</sup> which were 32.4%, and 46% respectively. Another study in Bangladesh discovered a prevalence of 32.5%<sup>(17)</sup> and in Saudi Arabia was (55.3%).<sup>(12)</sup>

The disparity could be related to different study populations and different age groups, as well as different data collection methods, as the current study used an online anonymous questionnaire method only, whereas other studies used both an online and a face-to-face interview.

On the other hand, higher educational level was significantly associated with receiving COVID-19 vaccinations in this study ( $p$  value 0.001), possibly because higher education is associated with increased knowledge and awareness about the vaccine's role in reducing the risk of disease occurrence.

Moreover, it could also be because higher educated people are more accustomed to and trust technology than less educated people as also revealed in a Malaysian study.<sup>(18)</sup>

In the current study, getting COVID-19 vaccines was significantly associated with occupation ( $p$  value  $< 0.05$ ). White collar workers (those who perform professional, managerial, or administrative work) had a better understanding of the importance of vaccination as a control and preventive measure.

Moreover, those who did not work, such as students who had suffered academic impairment because of the pandemic and housewives who were fed up with the social restrictions and wanted to put an end to it by accepting vaccination.

In the current study, Previous infection with COVID-19 was associated significantly with obtaining COVID-19 vaccinations ( $p$  value 0.005) as the perceived severity of COVID-19 infection increased among those populations and was associated with the higher intention regarding the necessity of receiving the vaccine as a preventive measure for the disease reoccurrence.

In this study, the vaccinated participants used MOHP and international organization websites as sources of information about COVID-19 vaccines and attended courses about COVID-19 more frequently than non-

vaccinated participants, with  $p$  value =0.03 and 0.003, respectively.

This could be explained by higher literacy on health-related issues among the vaccinated population from the most trusted sources and lower access to the misinformation regarding the vaccine efficacy and safety that increase the fears, anxiety, and doubts over the new vaccines leading to overestimating possible side effects.<sup>(19)</sup>

In the current study, receiving COVID-19 vaccination was significantly higher among those who had positive beliefs toward the vaccines, which was consistent with different studies<sup>(12,20&21)</sup> which showed that people with a negative attitude toward the vaccination were less willing to receive the vaccine.

It's not surprising that participants' positive beliefs toward vaccination were strongly associated with their desire to be vaccinated, as evidenced in several countries in the case of a variety of illnesses, including the H1N1 vaccine according to a study conducted by Bish and co-authors.<sup>(22)</sup>

In this study, the main vaccination barriers were fear of unknown adverse effects, doubt in vaccine safety, and fear of long-term genetic effects of some vaccine types.

This finding agreed with other studies (12,23&24) which found that the vaccine's serious side effects and lack of trustworthy information contributed to vaccine hesitancy.

Furthermore in this study, more than half of vaccine refusers (56.6%) would accept vaccination if more research proved the safety and effectiveness of COVID-19 vaccination, which could be explained by the rapid vaccine development process that similarly occurred during the development of the H1N1 vaccine according to a study conducted by Seale, *et al.*, 2009 (25) and it is expected that many hesitant individuals will accept vaccination if they were reassured and provided with trustable information about the safety and effectiveness of the vaccine. (16)

### **Conclusion and recommendations:**

Worries about vaccination side effects and safety were identified as the main barriers to vaccine adoption in this study, and these concerns may hinder the attainment of the properly required immunization. So, the worried sector of the population may not be convinced of getting these new vaccines and adopting this new experience and therefore more evidence by many further studies about the safety and effectiveness of those vaccines may raise their confidence and consequently their

awareness regarding those new vaccines and hence increase vaccination coverage.

### **Study limitation:**

The nonrandom convenience sample made it a non-representative sample. Most of the participants were educated, with a large percentage being highly educated, and most of them were in professional jobs (65.1%).

Furthermore, these vaccinations were mandatory in their jobs. All these factors contributed to a decrease in the percentage of vaccine hesitancy.

### **Competing Interests:**

The authors declared that there was no conflict of interest.

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**Table (1): Sociodemographic characteristics and its associations with receiving COVID-19 vaccine among the study participants n=289:**

| Character                                    | N (%)            | Non-vaccinated    | vaccinated        | $\chi^2$           | P value | OR (95% CI) <sup>a</sup> |
|--|------------------|-------------------|-------------------|--------------------|---------|--------------------------|
| <b>Age (years): Mean <math>\pm</math> SD</b> | 36.1 $\pm$ 11.36 | 37.64 $\pm$ 13.56 | 35.55 $\pm$ 10.45 | 1.38 <sup>b</sup>  | 0.17    | (-0.89-5.1)              |
| <b>Gender</b>                                |                  |                   |                   |                    |         |                          |
| ▪ Male                                       | 117(40.5)        | 26(22.2)          | 91(77.8)          | 1.69               | 0.19    | 0.69(0.4-1.2)            |
| ▪ Female                                     | 172(59.5)        | 50(29.1)          | 122(70.9)         |                    |         |                          |
| <b>Marital status</b>                        |                  |                   |                   |                    |         |                          |
| ▪ Single                                     | 92(31.8)         | 22(23.9)          | 70(76.1)          | 1.04               | 0.59    |                          |
| ▪ Married                                    | 190(65.7)        | 53(27.9)          | 137(72.1)         |                    |         |                          |
| ▪ Divorced                                   | 7(2.4)           | 1(14.3)           | 6(85.7)           |                    |         |                          |
| <b>Educational level</b>                     |                  |                   |                   |                    |         |                          |
| ▪ Primary education                          | 5(1.7)           | 4(80)             | 1(20)             |                    |         |                          |
| ▪ Elementary education                       | 10(3.5)          | 5(50)             | 5(50)             |                    |         |                          |
| ▪ Secondary education                        | 12(4.2)          | 7(58.3)           | 5(41.7)           | 16.42 <sup>c</sup> | 0.001   |                          |
| ▪ University education                       | 108(37.4)        | 26(24.1)          | 82(75.9)          |                    |         |                          |
| ▪ Postgraduate education                     | 154(53.3)        | 34(22.1)          | 120(77.9)         |                    |         |                          |
| <b>Occupation</b>                            |                  |                   |                   |                    |         |                          |
| ▪ White collar                               | 188(65.1)        | 39(20.7)          | 149(79.3)         |                    |         |                          |
| ▪ Blue collar                                | 11(3.8)          | 8(72.7)           | 3(27.3)           | 16.86              | 0.000   |                          |
| ▪ Don't work (as housewives, students..)     | 90(31.1)         | 29(32.2)          | 61(67.8)          |                    |         |                          |

<sup>a</sup>: OR: odds ratio; CI: confidence interval, <sup>b</sup> : Independent t test, <sup>c</sup>: fisher's exact

**Table (2): Description of health-related conditions and its associations with receiving COVID-19 vaccine among the study participants n=289:**

| Description of health-related conditions            | N (%)        |                       |                   |                  |                |                     |
|---|--------------|-----------------------|-------------------|------------------|----------------|---------------------|
| <b>Getting COVID-19 vaccination</b>                 |              |                       |                   |                  |                |                     |
| ▪ Vaccinated  | 213(73.7)    |                       |                   |                  |                |                     |
| ▪ Not vaccinated                                    | 76(26.3)     |                       |                   |                  |                |                     |
| <b>Health related conditions:</b>                   | <b>N (%)</b> | <b>Non-vaccinated</b> | <b>vaccinated</b> | $\chi^2$         | <b>P value</b> | <b>OR (95% CI)</b>  |
| <b>Having chronic diseases</b>                      |              |                       |                   |                  |                |                     |
| ▪ No  | 237(82)      | 62(26.2)              | 175(73.8)         | 0.013            | 0.91           | 0.96<br>(0.49-1.89) |
| ▪ Yes   | 52(18)       | 14(26.9)              | 38(73.1)          |                  |                |                     |
| <b>Getting the influenza vaccine</b>                |              |                       |                   |                  |                |                     |
| ▪ Never   | 221(76.5)    | 66(29.9)              | 155(70.1)         | 6.55             | 0.09           |                     |
| ▪ last year   | 34(11.9)     | 6(17.6)               | 28(82.4)          |                  |                |                     |
| ▪ In the current flu season (2021-2022)             | 20(6.9)      | 2(10)                 | 18(90)            |                  |                |                     |
| ▪ Annually  | 14(4.8)      | 2(14.3)               | 12(85.7)          |                  |                |                     |
| <b>Self-perception of health status</b>             |              |                       |                   |                  |                |                     |
| ▪ Bad   | 3(1)         | 2(66.7)               | 1(33.3)           | 6.8 <sup>a</sup> | 0.07           |                     |
| ▪ Average   | 74(25.6)     | 26(35.1)              | 48(64.9)          |                  |                |                     |
| ▪ Good  | 148(51.2)    | 33(22.3)              | 115(77.7)         |                  |                |                     |
| ▪ Very good   | 64(22.1)     | 15(23.4)              | 49(76.6)          |                  |                |                     |
| <b>Previous infection with COVID-19</b>             |              |                       |                   |                  |                |                     |
| ▪ Not infected                                      | 64(22.1)     | 15(24.3)              | 49(76.6)          | 13.04            | 0.005          |                     |
| ▪ I don't know                                      | 62(21.5)     | 26(41.9)              | 36(58.1)          |                  |                |                     |
| ▪ Yes, and not confirmed                            | 104(36)      | 27(26)                | 77(74)            |                  |                |                     |
| ▪ Yes, and confirmed                                | 59(20.4)     | 8(13.6)               | 51(86.4)          |                  |                |                     |
| <b>COVID-19 infection in close social network</b>   |              |                       |                   |                  |                |                     |
| ▪ not infected                                      | 12(4.2)      | 5(41.7)               | 7(58.3)           | 3.22             | 0.36           |                     |
| ▪ I don't know                                      | 10(3.5)      | 4(40)                 | 6(60)             |                  |                |                     |
| ▪ Yes, and not confirmed                            | 70(24.2)     | 20(28.6)              | 50(71.4)          |                  |                |                     |
| ▪ Yes, and confirmed                                | 197(68.2)    | 47(23.9)              | 150(76.1)         |                  |                |                     |
| <b>Source of information about COVID-19 vaccine</b> |              |                       |                   |                  |                |                     |
| ▪ Social media                                      | 205(70.9)    | 56(27.3)              | 149(72.7)         | 0.38             | 0.54           | 0.8(0.5-1.5)        |
| ▪ TV  | 130(45)      | 38(29.2)              | 92(70.8)          | 1.05             | 0.31           | 0.8(0.5-1.3)        |
| ▪ Official web sites of MOHP                        | 148(51.2)    | 31(20.9)              | 117(79.1)         | 4.48             | 0.03           | 1.8(1.04-3)         |
| ▪ International organization websites               | 84(29.1)     | 12(14.3)              | 72(85.7)          | 8.82             | 0.003          | 2.7(1.4-5.4)        |
| <b>Attendance of COVID-19 courses</b>               |              |                       |                   |                  |                |                     |
| ▪ No  | 259(89.6)    | 73(28.2)              | 186(71.8)         | 4.59             | 0.03           | 3.53(1.04-12)       |
| ▪ Yes   | 30(10.4)     | 3(10)                 | 27(90)            |                  |                |                     |

<sup>a</sup>: fisher's exact test

**Table (3): Distribution of studied participants according to their beliefs and its associations with receiving COVID-19 vaccine n=289:**

| Variables   | N (%)     | Non-vaccinated | vaccinated | $\chi^2$ | P value |
|---|-----------|----------------|------------|----------|---------|
| <b>Do you think that the COVID-19 vaccine would be safe?</b>                  |           |                |            |          |         |
| ▪ No  | 30(10.4)  | 17(56.7)       | 13(43.3)   | 30.9     | 0.000   |
| ▪ Not sure  | 182(63)   | 54(29.7)       | 128(70.3)  |          |         |
| ▪ Yes   | 77(26.6)  | 5(6.5)         | 72(93.5)   |          |         |
| <b>Do you think that the COVID-19 vaccine would be effective?</b>             |           |                |            |          |         |
| ▪ No  | 36(12.5)  | 18(50)         | 18(50)     | 19.2     | 0.000   |
| ▪ Not sure  | 181(62.6) | 50(27.6)       | 131(72.4)  |          |         |
| ▪ Yes   | 72(24.9)  | 8(11.1)        | 64(88.9)   |          |         |
| <b>Best way to avoid complications of COVID-19 is by getting the vaccine?</b> |           |                |            |          |         |
| ▪ No  | 62(21.5)  | 30(48.4)       | 32(51.6)   | 34.1     | 0.000   |
| ▪ Not sure  | 121(41.9) | 37(30.6)       | 84(69.4)   |          |         |
| ▪ Yes   | 106(36.7) | 9(8.5)         | 97(91.5)   |          |         |
| <b>Greater public awareness is needed about COVID-19 vaccine?</b>             |           |                |            |          |         |
| ▪ No  | 25(8.7)   | 9(36)          | 16(64)     | 9.24     | 0.01    |
| ▪ Not sure  | 30(10.4)  | 14(46.7)       | 16(53.3)   |          |         |
| ▪ Yes   | 234(81)   | 53(22.6)       | 181(77.4)  |          |         |
| <b>To which degree do you perceive that vaccine is important?</b>             |           |                |            |          |         |
| ▪ not important   | 45(15.6)  | 25(55.6)       | 20(44.4)   | 31.3     | 0.000   |
| ▪ somewhat important  | 157(54.3) | 42(26.8)       | 115(73.2)  |          |         |
| ▪ extremely important   | 87(30.1)  | 9(10.3)        | 78(89.7)   |          |         |
| <b>Everyone in the community should get the COVID-19 vaccine?</b>             |           |                |            |          |         |
| ▪ not important   | 42(14.5)  | 23(54.8)       | 19(45.2)   | 38.7     | 0.000   |
| ▪ somewhat important  | 147(50.9) | 46(31.3)       | 101(68.7)  |          |         |
| ▪ extremely important   | 100(34.6) | 7(7)           | 93(93)     |          |         |
| <b>Vaccination of COVID-19 should always be compulsory?</b>                   |           |                |            |          |         |
| ▪ not important   | 109(37.7) | 51(46.8)       | 58(53.2)   | 40.9     | 0.000   |
| ▪ somewhat important  | 100(34.6) | 19(19)         | 81(81)     |          |         |
| ▪ extremely important   | 80(27.7)  | 6(7.5)         | 74(92.5)   |          |         |

**Table (3) Continued: Distribution of studied participants according to their beliefs and its associations with receiving COVID-19 vaccine n=289:**

| Variables   | N (%)     | Non-vaccinated | vaccinated | $\chi^2$ | P value |
|---|-----------|----------------|------------|----------|---------|
| <b>The way to overcome the COVID-19 pandemic is mass vaccination?</b>     |           |                |            |          |         |
| ▪ Disagree  | 58(20.1)  | 33(56.9)       | 25(43.1)   | 45.4     | 0.000   |
| ▪ Neutral   | 114(39.4) | 32(28.1)       | 82(71.9)   |          |         |
| ▪ Agree   | 117(40.5) | 11(9.4)        | 106(90.6)  |          |         |
| <b>The best preventive measure for COVID-19 is getting vaccinated?</b>    |           |                |            |          |         |
| ▪ Disagree  | 60(20.8)  | 35(58.3)       | 25(41.7)   | 48.3     | 0.000   |
| ▪ Neutral   | 120(41.5) | 31(25.8)       | 89(74.2)   |          |         |
| ▪ Agree   | 109(37.7) | 10(9.2)        | 99(90.8)   |          |         |
| <b>Do you have concerns regarding the adverse effects of the vaccine?</b> |           |                |            |          |         |
| ▪ Disagree  | 28(9.7)   | 1(3.6)         | 27(96.4)   | 28       | 0.000   |
| ▪ Neutral   | 65(22.5)  | 5(7.7)         | 60(92.3)   |          |         |
| ▪ Agree   | 196(67.8) | 70(35.7)       | 126(64.3)  |          |         |
| <b>Do you against vaccination in general?</b>                             |           |                |            |          |         |
| ▪ Disagree  | 198(68.5) | 39(19.7)       | 159(80.3)  | 14.3     | 0.001   |
| ▪ Neutral   | 72(24.9)  | 30(41.7)       | 42(58.3)   |          |         |
| ▪ Agree   | 19(6.6)   | 7(36.8)        | 12(63.2)   |          |         |
| <b>Concerns for the acquisition of Covid-19 from the vaccine?</b>         |           |                |            |          |         |
| ▪ Disagree  | 86(29.8)  | 10(11.6)       | 76(88.4)   | 18.1     | 0.000   |
| ▪ Neutral   | 88(30.4)  | 22(25)         | 66(75)     |          |         |
| ▪ Agree   | 115(39.8) | 44(38.3)       | 71(61.7)   |          |         |
| <b>Total belief score</b>   |           |                |            |          |         |
| ▪ Negative belief (anti-vaccination)                                      | 160(55.4) | 62(38.8)       | 98(61.2)   | 28.7     | 0.000   |
| ▪ Positive belief(pro-vaccination)  | 129(44.6) | 14(10.9)       | 115(89.1)  |          |         |

<sup>a</sup> : OR: odds ratio; CI: confidence interval

**Table (4): Distribution of participants' barriers and motivators associated with COVID-19 vaccination acceptance n=76**

| <b>Variables</b>  | <b>N (%)</b> |
|---|--------------|
| ▪ Doubt in vaccine safety   | 41(53.9)     |
| ▪ Doubt in vaccine effectiveness  | 39(51.3)     |
| ▪ Fear of unknown adverse effects   | 51(67.1)     |
| ▪ Fear of long-term genetic effects of some vaccine types   | 39(51.3)     |
| ▪ Fear of (nanochips) implantation via the vaccine  | 15(19.7)     |
| ▪ Insufficient trust in the vaccination source (producer)   | 22(28.9)     |
| ▪ Insufficient information regarding the vaccine  | 26(34.2)     |
| ▪ Insufficient information regarding the potential adverse effects  | 32(42.1)     |
| ▪ I don't believe that the vaccine will stop the infection.   | 34(44.7)     |
| ▪ I don't need the vaccine because I do all the right things. I wash my hands and wear a mask and gloves. | 7(9.2)       |
| ▪ I don't like needles.   | 4(5.3)       |
| ▪ The COVID-19 vaccine is a conspiracy.   | 3(3.9)       |
| ▪ I don't need the vaccine because I'm young and healthy.   | 4(5.3)       |
| ▪ Others  | 3(3.9)       |
| <b>Motivators</b>   | <b>N(%)</b>  |
| ▪ Fear of being infected with COVID-19  | 22(28.9)     |
| ▪ Fear of infecting my family with COVID-19 especially my parents   | 21(27.6)     |
| ▪ If my physician recommended it to me.   | 15(19.7)     |
| ▪ If it was mandatory by my Job.  | 10(13.2)     |
| ▪ If it was compulsory by the government (MOH).   | 17(22.4)     |
| ▪ If my family or friends got vaccinated.   | 5(6.6)       |
| ▪ If I know that more studies showed that the vaccine is safe and effective                               | 43(56.6)     |
| ▪ If there is a way other than injection  | 6(7.9)       |
| ▪ Others  | 3(3.9)       |

**Table (5): Predictors of COVID-19 vaccine acceptance n=289:**

| Variables                               | B      | P     | OR    | 95% CI      |
|---|--------|-------|-------|-------------|
| <b>Age</b>                              | -0.012 | 0.54  | 0.99  | 0.95-1.03   |
| <b>Gender</b>                           |        |       |       |             |
| ▪ Male                                  | 0.45   | 0.23  | 1.56  | 0.76-3.22   |
| ▪ Female                                |        |       |       | 1(r)        |
| <b>Marital status</b>                   |        |       |       |             |
| ▪ Single                                |        | 0.85  |       | 1(r)        |
| ▪ Married                               | -0.14  | 0.75  | 0.87  | 0.36-2.13   |
| ▪ Divorced                              | 0.49   | 0.71  | 1.65  | 0.12-22.39  |
| <b>Educational level</b>                |        |       |       |             |
| ▪ Primary education                     | -2.18  | 0.33  | 0.11  | 0.007-1.93  |
| ▪ Elementary education                  | 0.44   | 0.13  | 1.54  | 0.095-25.14 |
| ▪ Secondary education                   | -1.14  | 0.76  | 0.32  | 0.06-1.57   |
| ▪ University education                  | -0.023 | 0.16  | 0.98  | 0.47-2.03   |
| ▪ Postgraduate education                |        | 0.95  |       | 1(r)        |
| <b>Occupation</b>                       |        |       |       |             |
| ▪ White collar                          |        | 0.1   |       | 1(r)        |
| ▪ Blue collar                           | -3.27  | 0.037 | 0.038 | 0.002-0.83  |
| ▪ Don't work                            | -0.31  | 0.45  | 0.73  | 0.32-1.65   |
| <b>Having chronic diseases</b>          |        |       |       |             |
| ▪ No                                    |        |       |       | 1(r)        |
| ▪ Yes                                   | -0.048 | 0.92  | 0.95  | 0.39-2.34   |
| <b>Getting influenza vaccine</b>        |        |       |       |             |
| ▪ Never                                 | -0.63  | 0.49  | 0.53  | 0.09-3.22   |
| ▪ last year                             | -0.45  | 0.66  | 0.63  | 0.09-4.69   |
| ▪ In the current flu season (2021-2022) | 0.72   | 0.57  | 2.06  | 0.17-25.37  |
| ▪ Annually                              |        | 0.46  |       | 1(r)        |
| <b>Previous COVID-19 infection</b>      |        |       |       |             |
| ▪ Not infected                          | -0.37  | 0.52  | 0.69  | 0.23-2.12   |
| ▪ I don't know                          | -1.26  | 0.02  | 0.28  | 0.1-0.79    |
| ▪ Yes, and not confirmed                | -0.47  | 0.34  | 0.62  | 0.24-1.64   |
| ▪ Yes, and confirmed                    |        | 0.07  |       | 1(r)        |
| <b>Total belief score</b>               |        |       |       |             |
| ▪ Negative belief                       | -2.1   | 0.000 | 0.12  | 0.05-0.27   |
| ▪ Positive belief                       |        |       |       | 1(r)        |
| <b>Constant</b>                         | 4.27   | 0.000 | 71.37 |             |

r reference category

## الملخص العربي

### المعتقدات والمعوقات المرتبطة بالتطعيمات ضد فيروس كورونا المستجد (كوفيد-19) بين عينة من المصريين البالغين بمحافظة القاهرة- مصر

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**الخلفية:** لقد أصبح التردد في اللقاحات خلال جائحة كورونا، مهمًا بشكل متزايد حيث تكافح الحكومات في جميع أنحاء العالم لإقناع السكان بالمشاركة في بروتوكولات المناعة. **أهداف الدراسة:** حساب نسبة التردد لتلقي لقاح كورونا، وتقييم المعتقدات والعوائق تجاه لقاحات كورونا بين عينة من البالغين المصريين بالقاهرة. **طريقة البحث:** لقد أجريت دراسة مقطعية على البالغين الذين تبلغ أعمارهم 18 سنة فأكثر، وقد تضمنت عينة ملائمة من 289 مصريًا بالغًا في الدراسة من خلال إرسال استبيان مجهول الهوية عبر الإنترنت مترجم باللغة العربية. وقد تم تقسيم الاستبيان إلى: الخصائص الاجتماعية والديموغرافية، المعتقدات تجاه التطعيمات كورونا والعوائق التي حالت دون التطعيمات. **نتائج البحث:** كان متوسط عمر المشاركين في الدراسة  $36,1 \pm 11,36$ ، وقد بلغت نسبة التردد لتلقي اللقاح 26,3% في عينة الدراسة، وقد ارتبط المستوى التعليمي والمهني والاصابة بعدوى سابقة بـ كورونا بشكل كبير بتلقي لقاحات كورونا (القيمة الاحتمالية  $> 0,05$ ). وقد تضمنت اغلب اسباب الرفض للقاح بسبب القلق من الآثار الجانبية لدي المشاركين (1,67%)، سلامة اللقاح (9,53%)، و أخيرا الآثار الجينية طويلة المدى لبعض أنواع اللقاحات (3,51%). **الخلاصة:** هناك حاجة إلى مزيد من الدراسات للتحقق من سلامة وفعالية اللقاحات الموجودة وبالتالي يمكن زيادة نسبة الاقبال علي اللقاح بين فئة كبيرة من المصريين. **التوصيات:** هناك حاجة إلى مزيد من الدراسات التدخلية المستقبلية مع عينة تمثيلية عشوائية لمنع التحيز.