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# The attitude of fully vaccinated individuals towards COVID-19 vaccine booster dose: a transverse study from Jordan

**Sawsan Abuhammad[1,*], Karem H. Alzoubi[2,3], Omar F. Khabour[4], Shaher Hamaideh[5] and Maryam K. El-zubi[6]**

[1]Department of Maternal and Child Health, Jordan University of Science and Technology, Irbid, Jordan
[2]Department of Pharmacy Practice and Pharmacotherapeutics, University of Sharjah, Sharjah, UAE
[3]Department of Clinical Pharmacy, Jordan University of Science and Technology, Irbid, Jordan
[4]Dept. of Medical Laboratory Sciences, Jordan University of Science and Technology, Irbid, Jordan
[5]Department of Community and Mental Health Nursing, Faculty of Nursing, The Hashemite University, Zarqa, Jordan
[6]Faculty of Pharmacy, Jordan University of Science and Technology, Irbid, Jordan

*Correspondence: Sawsan Abuhammad, Department of Maternal and Child Health, Jordan University of Science and Technology, Irbid 22110, Jordan.
Email: Shabuhammad@just.edu.jo

## Abstract

**Objectives** COVID-19 vaccines are efficient against serious infections, and those initiated by the various variants. Many high- and middle-income countries have decided to offer third-dose boosters to ensure their populations remain protected against novel COVID-19 variants before additional waves of COVID-19. This study aims to assess individuals' attitudes towards COVID-19 booster vaccination dose and to determine predictors of this attitude.

**Methods** This study used a cross-sectional descriptive design. The inclusion criteria for participants were Jordanian adults who had been fully vaccinated against COVID-19. A quota sampling strategy based on the participant's, age and gender was used to ensure that the sample was broadly representative of the general population in Jordan. The instrument was distributed across popular social networking sites such as Facebook and WhatsApp. The study was conducted in October 2021.

**Key findings** The response rate of this study was 63.5% ($n$ = 952). The mean score of attitudes towards a booster dose of COVID-19 was 47.1 ± 8.2, indicating that about half of the sample was supportive to the booster dose. There were differences in the acceptability of a booster dose for COVID-19 according to the demographic and clinical characteristics of the participants. Individuals with high income ($B$ = 0.210, $P$ = 0.000), high educational level ($B$ = −0.076, $P$ = 0.026), those who have suffered vaccine side effects ($B$ = −0.081, $P$ = 0.013) and follow the news about COVID-19 ($B$ = 0.076, $P$ = 0.043) were more likely to accept the booster dose than the other groups.

**Conclusions** Participants had mixed attitudes towards the booster dose with about half of the participants willing to take the booster. Some factors associated with such attitude were identified. The findings are useful in developing and implementing effective vaccination strategies that target people who are not ready to take a booster dose.

**Keywords:** COVID-19; third dose; vaccine; Jordan; willingness; prevalence

## Introduction

The SARS-CoV-2 variants with the potential of fast spread are exacerbating a worldwide public health crisis.[1] New variants such as the Omicron SARS-CoV-2, which has the advantage of being highly contagious, have resulted in an urgent need for the ideal timing of booster doses for individuals who have already received full vaccination.[2, 3] However, to enhance the immunity of this population, the decision should be informed by evidence regarding the potential risks and benefits to individuals and society.[4] In general, COVID-19 vaccines are efficient against serious infections, and those initiated by the various variants.[5] Many high- and middle-income countries have decided to offer third-dose boosters to ensure their populations remain protected against novel COVID-19 variants before additional waves of COVID-19.[6, 7] For example, Turkey began administrating booster doses in July 2021 for healthcare professionals and individuals over 50 years of age to enhance immunity. Uruguay has launched a similar initiative to boost the immune response of fully vaccinated individuals.[8] Similarly, the USA rolled out booster doses for adults as of 20 September 2021.[4] The booster dose was administered 8 months after the second dose was received. The US booster-dose campaign focused on nursing home residents, the elderly, healthcare workers and immunocompromised individuals.[9, 10] Hundreds of millions of people worldwide had received booster doses by June 2022.

Since many have agreed to offer a booster dose to the full-vaccinated individuals, the question that has been raised is whether people will get the same brand of vaccine as a booster. In countries such as Cambodia, Uruguay, Ireland and Thailand, different types of COVID-19 vaccines have been offered as a booster. However, in the USA, the government recommended that people stick to the same brand that they received during the full vaccination.

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Jordan was the least willing Arab nation, according to a study of 2925 individuals from Saudi Arabia, Iraq, Lebanon and Jordan to acquire COVID-19 vaccinations.[11] Jordan has a history of vaccine reluctance and is an alarming obstacle that controls the proliferation of more infectious diseases,[12] like low rates of acceptance and coverage immunization against the seasonal flu has also been noted. This is consistent with the previous study, which is among the participants, just 14.9% have received or are preparing to be vaccinated against the seasonal flu.[13] Most studies that are currently accessible have looked at the popularity of the COVID-19 vaccine,[14–16] however, few studies looked into the acceptability of the public towards the booster dose.[5] In Jordan, the government has offered a booster dose to individuals who had been fully vaccinated for at least 6 months. However, a small portion of the population received the booster dose. Thus, the assessment of individuals' attitudes towards the booster vaccination dose will facilitate the development of an intervention to promote the COVID-19 vaccination program in Jordan. Therefore, this study aims to assess individuals' attitudes towards COVID-19 booster dose and to identify predictors of this attitude.

## Method

This cross-sectional survey was conducted in October 2021. It involved participants completing an online survey through Google Forms. The inclusion criteria were adults (≥ 18 years old) who live in Jordan and have received two doses of the COVID-19 vaccine (fully vaccinated). The quota sampling strategy used was based on the participant's ages and gender to ensure that the sample was a broad representation of the general population in Jordan. The instrument of the study was distributed through famous social media sites such as Facebook and WhatsApp. Also, many pamphlets were distributed in many health centres for the study by many researcher assistants.

The sample size of the study was calculated using G-Power 3.1, Universitat Kiel, Germany, based on convenience/quota sample method, small effect size, alpha of 0.05 and power of 0.95. The required minimum number of participants was 930. Out of 1507 people who started the survey, 1059 reached the final stages of the study and 107 were excluded due to being not fully vaccinated. Thus, the final working number of study participants was 952.

### Instrument

The study instrument was called Attitude of People towards COVID-19 Vaccination Booster Dose, and it was built based on a previous study that used a similar instrument to examine the attitude of people towards COVID-19 vaccination.[10, 11, 17] Content as well as face validations were carried out. Firstly, a group of experts provided feedback on the items of the survey, where it was modified as per their comments. Next, the modified draft of the survey went through pilot testing on 30 participants to provide feedback about the clarity and comprehensibility of the items of the survey. The researchers used a self-administered questionnaire. The variables included in this study were socio-demographic characteristics such as gender, age, marital status, family income, educational levels and health status. This instrument also asked about perception towards contracting COVID-19, COVID-19 vaccine benefits, barriers to receiving the COVID-19 vaccine booster, self-efficacy, behavioural control, trust in government, anticipated regret, knowledge and subjective norms. The questionnaire items assessed concerns related to the participants' beliefs that vaccination would enable them to return to normal life and adhere to social distancing and other COVID-19-related restrictions. The items of the survey were rated using a 5-point Likert scale ranging from 'strongly agree' to 'strongly disagree'. The Cronbach alpha of the instrument was 0.89.

### Ethical considerations

The research was ethically approved by the Institutional Review Board (IRB) at The Hashemite University (IRB approval number: 11/1/2021/2022). The researchers assured the participants who accepted to participate in the study of their right to withdraw from the study at any point. All study participants were provided with information regarding the purpose of the study, potential risks and benefits. Confidentiality was fully achieved as no name or any information that could reveal the identity of the participant in the study questionnaire was asked. An electronic consent form was obtained from all participants, which was in the form of the required item where the 'agree' choice was mandatory for the participants to get access to the study questionnaire. The study adhered to the Helinski Declaration of Ethics.

### Data analysis

Data retrieved from the survey were examined using SPSS version 25 (IBM Corp). Before statistical analysis data were cleaned and incomplete responses were curtailed. The data type was categorical and has been converted into the numeric type to accomplish the findings, as well as the measures used 'standard deviation'. The dependent factor was the attitude of fully vaccinated individuals towards the COVID-19 vaccine booster dose and the independent factors were age, gender, insurance, working status, income, educational level, social status, having a child, living, smoking, suffered side effects of COVID-19 vaccination, how often do you follow the news related to COVID-19? The researchers calculated the descriptive statistics to explain the demographic factors of the study participants. The general linear model procedure was used to determine the factors associated with attitude score.

## Results

### Demographic characteristics

The response rate was moderate 63% ($n$ = 952). The number of males was 300 (31.5%) and the number of females was 652 (68.5%). The mean age of the participants was 32.2 (SD = 4.3). Of the study participants, 54.2% were married, 46.5% had a bachelor's degree, 45.5% of them had a full-time job and 52.1% had an income of less than 400JD (about $560). Approximately 75% of the study participants had medical insurance, Table 1.

### Public acceptance of booster dose and mixing of types of COVID-19 vaccination

The results showed that 273 (24.8%) agreed to receive a booster dose of the same type of vaccine they received for the previous two doses. In addition, 226 (23.6%) individuals only agreed to receive a different type of vaccine other than that they received in the previous two doses.

**Table 1** Demographical characteristics of the participants (*N* = 952)

| Items | Categories | Frequency | Percent |
|---|---|---|---|
| Gender | Male | 300 | 31.5 |
| | Female | 652 | 68.5 |
| Age | 18–24 | 255 | 26.9 |
| | 25–34 | 317 | 32.8 |
| | 35–44 | 264 | 27.7 |
| | ≥45 | 96 | 12.6 |
| Insurance | No | 239 | 25.1 |
| | Yes | 713 | 74.9 |
| Working status | I do not work | 210 | 22.1 |
| | Full-time employee | 432 | 45.4 |
| | Part-time employee | 91 | 9.6 |
| | Retired | 22 | 2.3 |
| | Student | 197 | 20.7 |
| Income level | Less than 400 Jordanian dinars | 496 | 52.1 |
| | 401–800 | 353 | 37.1 |
| | 801–1500 | 72 | 7.6 |
| | More than 1500 | 31 | 3.3 |
| Educational level | Primary or secondary | 138 | 14.5 |
| | Diploma | 108 | 11.3 |
| | University student | 144 | 15.1 |
| | Bachelor's | 443 | 46.5 |
| | Postgraduate | 119 | 12.5 |
| Social status | Single | 405 | 42.5 |
| | Married | 520 | 54.6 |
| | Divorced | 27 | 2.8 |
| Do you have a child | No | 447 | 47.0 |
| | Yes | 505 | 53.0 |
| Living areas | City | 641 | 67.3 |
| | Village | 311 | 32.7 |
| Smoking | No | 586 | 61.6 |
| | Yes | 366 | 38.4 |
| Do you have a family member 65 years of age or older? | No | 494 | 51.9 |
| | Yes | 458 | 48.1 |
| Side effect of COVID-19 vaccination | No | 269 | 28.3 |
| | Yes, the symptoms were mild | 526 | 55.3 |
| | Yes, the symptoms were severe | 157 | 16.5 |
| If you have sons or daughters (12 to under 18 years old), do you agree to receive a vaccination? | Yes, my children have received the vaccination | 391 | 41.1 |
| | Yes, but my children haven't received the vaccine yet | 91 | 9.6 |
| | No | 109 | 11.4 |
| | I do not have children from 5 to under 12 years old | 361 | 37.9 |
| If you have sons or daughters (5 to under 12 years old), do you agree to receive a vaccination? | Yes, my children have received the vaccination | 466 | 48.9 |
| | Yes, but my children haven't received the vaccine yet | 83 | 8.7 |
| | No | 103 | 10.8 |
| | I do not have children from 5 to under 12 years old | 300 | 31.5 |

**Table 1** Continued

| Items | Categories | Frequency | Percent |
|---|---|---|---|
| Have you had COVID-19?* | No | 593 | 62.3 |
| | Yes, before receiving the first dose of the vaccine | 318 | 33.4 |
| | Yes, after receiving the first dose of the vaccine | 10 | 1.1 |
| | Yes, after the second dose of the vaccine | 26 | 2.7 |
| | Yes, I was infected, and I did not receive any vaccinations | 5 | .5 |
| Have you ever had a flu shot before? | No | 560 | 58.8 |
| | Yes | 313 | 32.9 |
| | Maybe | 79 | 8.3 |
| Are you ready to take the booster dose of the corona vaccine? | No | 384 | 40.3 |
| | Yes | 362 | 38.0 |
| | Maybe | 206 | 21.6 |
| How often do you see news related to COVID-19?* | Never | 214 | 22.5 |
| | Rarely | 266 | 27.9 |
| | Sometimes | 240 | 25.2 |
| | Always | 232 | 24.4 |
| | Total | 952 | 100.0 |

### Description of attitude towards booster dose of COVID-19 vaccine among Jordanian

The mean score of attitudes towards booster dose of COVID-19 among Jordanians was 47.1 (SD = 8.2). This score indicates that about half of the participants had a negative attitude towards the booster dose. The highest agreement was with the following items: only people at risk of serious illness from COVID-19 need a booster dose ($n$ = 419, 44%), if I get a booster dose, I will be protected from COVID-19 ($n$ = 370, 38.9%) and I'm afraid of needles ($n$ = 467, 49.1%). The highest disagreement was with the following statements (Table 2): a booster dose of the COVID-19 vaccination must be mandatory for each person who is able to receive it ($n$ = 450, 47.3%), and if I get a booster dose, I think I will not need to follow the social distancing and other restrictions imposed by the government during the COVID-19 pandemic ($n$ = 405, 42.5%).

### Predictors of attitude towards booster dose of COVID-19 among Jordanians

A multivariate regression analysis was adopted to identify the predictors of attitude towards booster dose of COVID-19 among Jordanians. The model is significant ($F$ = 7. 70, $P$ < 0.001, Table 3). Many factors were correlated with a positive attitude towards booster dose of COVID-19 among Jordanians. These factors include high income ($B$ = 0.210, $P$ = 0.000), high educational level ($B$ = –0.076, $P$ = 0.026), suffering from side effects of the vaccine ($B$ = –0.081, $P$ = 0.013), following the news about COVID-19 pandemic ($B$ = 0.076, $P$ = 0.043).

## Discussion

Most studies that are currently accessible have looked at the popularity of the COVID-19 vaccine in Middles East that includes Jordan,[14–16] however, few studies looked into the acceptability of the public towards the booster dose.[5] In Jordan, the government has offered a booster dose to individuals who had been fully vaccinated for at least 6 months. This study aimed to examine public acceptance in Jordan for a booster dose of the COVID-19 vaccine. In addition, factors influencing people's attitude towards the COVID-19 booster vaccination dose were also investigated. The mean score of attitudes towards a booster dose of COVID-19 was 47.1 ± 8.2, indicating that about half of the sample was a supportive booster dose. In previous studies that were conducted in Jordan, similar acceptance rates of booster doses were reported (44–45%).[18, 19]

This study found that many participants believed in the efficacy and ability of booster doses to protect against the consequences of COVID-19. This is consistent with a previous study conducted in several African and Middle Eastern countries.[20] A consistent finding regarding vaccine efficacy was reported by randomized clinical studies. Besides, a study revealed that vaccination provides a defence mechanism against serious COVID-19 disease, especially from major viral variants.[21]

This study found that about one-fifth of participants believed that only people at high risk of severe illness from COVID-19 needed a booster dose. Current evidence does not indicate a need for booster vaccines for the general population, as there is high efficacy against severe disease.[22] Although humoral immunity diminishes over time, the reduction in antibodies titre does not essentially forecast a decrease in vaccine efficacy over time.[23, 24] Moreover, vaccines that contain antigens of earlier pandemic phases have been reported to provide a humoral immune response against current variants of COVID-19.[25, 26] Among the remarkable points, it was reported that 36.6% of participants agreed with the following statement 'A booster dose of the coronavirus vaccination may infect me

**Table 2** Description of attitude towards booster dose of COVID-19 among Jordanian

| Items | Disagree | | Neutral | | Agree | |
|---|---|---|---|---|---|---|
| | Count | Row N% | Count | Row N% | Count | Row N% |
| 1. A booster dose of the COVID-19 vaccination must be mandatory for every person able to receive it | 450 | 47.3 | 315 | 33.1 | 187 | 19.6 |
| 2. Without a COVID-19 vaccination booster dose, I would probably catch the COVID-19 | 362 | 38.0 | 382 | 40.1 | 208 | 21.8 |
| 3. If I get a booster dose of the COVID-19 vaccination, I will be protected from the COVID-19. | 370 | 38.9 | 386 | 40.5 | 196 | 20.6 |
| 4. If I don't get a COVID-19 booster shot and end up with COVID-19, I'll regret not getting vaccinated | 380 | 39.9 | 328 | 34.5 | 244 | 25.6 |
| 5. It would be very easy for me to get a booster dose of the COVID-19 vaccination | 249 | 26.2 | 398 | 41.8 | 305 | 32.0 |
| 6. A booster dose of the corona virus vaccination may infect me with the corona virus | 184 | 19.3 | 420 | 44.1 | 348 | 36.6 |
| 7. I will be worried about suffering from the side effects of the booster dose of the corona virus vaccination | 394 | 41.4 | 315 | 33.1 | 243 | 25.5 |
| 8. I may regret receiving a booster dose of the COVID-19 vaccine if I later experience side effects from the vaccination | 328 | 34.5 | 345 | 36.2 | 279 | 29.3 |
| 9. The COVID-19 booster will be too new for me to be confident of getting vaccinated | 271 | 28.5 | 426 | 44.7 | 255 | 26.8 |
| 10. Most people will get a booster dose of the COVID-19 vaccination | 293 | 30.8 | 439 | 46.1 | 220 | 23.1 |
| 11. Other people like me will get a booster dose of the COVID-19 vaccination | 276 | 29.0 | 459 | 48.2 | 217 | 22.8 |
| 12. In general, vaccination is a good thing | 237 | 24.9 | 342 | 35.9 | 373 | 39.2 |
| 13. I'm afraid of needles | 199 | 20.9 | 286 | 30.0 | 467 | 49.1 |
| 14. If I get a booster dose, I think I will not need to follow the social distancing and other restrictions imposed by the COVID-19 | 405 | 42.5 | 342 | 35.9 | 205 | 21.5 |
| 15. I know enough about COVID-19 disease to make an informed decision about whether to get vaccinated | 250 | 26.3 | 413 | 43.4 | 289 | 30.4 |
| 16. I know enough about the COVID-19 vaccine to make an informed decision about whether to get vaccinated | 276 | 29.0 | 413 | 43.4 | 263 | 27.6 |
| 17. Only people at risk of serious illness from the COVID-19 need a booster dose of vaccination | 175 | 18.4 | 358 | 37.6 | 419 | 44.0 |
| 18. My family will approve a booster dose for the COVID-19 vaccination | 299 | 31.4 | 425 | 44.6 | 228 | 23.9 |
| 19. My friends will approve a booster dose for the COVID-19 vaccination | 293 | 30.8 | 493 | 51.8 | 166 | 17.4 |
| 20. If the government recommends a booster dose for the COVID-19 vaccination, I will get vaccinated | 302 | 31.7 | 377 | 39.6 | 273 | 28.7 |
| 21. If a healthcare professional recommends a booster dose for the COVID-19 vaccination, I will get vaccinated | 289 | 30.4 | 369 | 38.8 | 294 | 30.9 |
| 22. The COVID-19 vaccine booster dose is just a way to make money for vaccine manufacturers | 199 | 20.9 | 464 | 48.7 | 289 | 30.4 |
| 23. The COVID-19 vaccine will allow us to return to normal | 258 | 27.1 | 442 | 46.4 | 252 | 26.5 |
| 24. There will be no point in getting a booster shot against the COVID-19 unless I can return to my normal life | 281 | 29.5 | 403 | 42.3 | 268 | 28.2 |

with the coronavirus'. This highlights the importance of vaccine literacy. In fact, previous studies have explored how vaccine literacy and vaccine confidence index may impact vaccine acceptance, which highlights the need for a continued public educational campaign to raise COVID-19 literacy.[27]

In this study, some participants reported that their families would not support a booster dose of the COVID-19 vaccination for them (32.9%) and stated that their friends would not support a booster dose of the COVID-19 vaccination (32.3%). Previous studies have focused on determining the comparative impact of friends, family, public health professionals and physicians on an individual's decision to receive the vaccine.[28, 29] Furthermore, factors related to vaccine advice and recommendation are complicated when considering COVID-19 due to the unprecedented politicization of potential treatment and public health responses exacerbated by political and medical disputes over promoting the untested use of hydroxychloroquine and the administration's withdrawal of US funding from WHO in response to a suspected cover-up and mishandling of the outbreak.[30]

Our study found that several factors were correlated with attitude towards the booster dose of COVID-19 vaccines

**Table 3** Predictors of attitude towards booster dose of COVID-19 among Jordanian

| Model | Unstandardized coefficients | | Standardized coefficients | *t* | Sig. |
|---|---|---|---|---|---|
| | *B* | Std. error | Beta | | |
| Constant | 45.403 | 2.649 | | 17.141 | 0.000 |
| Age | 0.051 | 0.037 | 0.063 | 1.384 | 0.167 |
| Gender | −0.892 | 0.648 | −0.051 | −1.376 | 0.169 |
| Insurance | 0.195 | 0.641 | 0.01 | 0.305 | 0.76 |
| Working status | −0.084 | 0.232 | −0.014 | −0.362 | 0.718 |
| Income | 2.249 | 0.381 | 0.21 | 5.902 | 0 |
| Educational level | −0.499 | 0.225 | −0.076 | −2.224 | 0.026 |
| Social status | 0.56 | 0.86 | 0.037 | 0.652 | 0.515 |
| Have child | −1.733 | 0.95 | −0.106 | −1.825 | 0.068 |
| Living | 0.659 | 0.579 | 0.038 | 1.138 | 0.256 |
| Smoking | 0.895 | 0.593 | 0.053 | 1.51 | 0.131 |
| Side effect of COVID-19 vaccination | −1.005 | 0.405 | −0.081 | −2.484 | 0.013 |
| How often do you see news related to COVID-19?* | 0.503 | 0.249 | 0.067 | 2.023 | 0.043 |

Dependent variable: attitude towards booster dose.

among Jordanians. The predictors included in the regression model were age, gender, insurance, working status, income, educational level, social status, have child living with you, smoking, side effect of COVID-19 vaccination, vaccination status and hearing COVID-19 news. The significant predictors were just income, educational level, vaccination status, side effects and hearing news related to COVID-19. In this regard, people with high income, high educational degrees and hearing news about COVID-19 had a more positive attitude towards the COVID-19 booster dose. This provides insight into the groups and characteristics linked to vaccine hesitancy. The findings could be valuable to public health efforts as they promote effective communication of information regarding the COVID-19 vaccine. Public efforts should implement outreach strategies focused on the concerns of minorities and older adults at greater risk of contracting COVID-19.

## Limitations

There are some limitations to this study. First, this study used a cross-sectional design that limits the ability to have a general reference for a cause-and-effect relationship. Secondly, the data were self-reported, which decreases the reliability of the study. Another issue could be related to the study response rate (65.2%), which was relatively lower than expected. Yet, it is notable that a low response rate is inherent in online self-administrated surveys where participants feel less obligated to complete the survey as compared with in-person data collection methods. Moreover, the data collection was based on social media sites, including Facebook or WhatsApp, which can be available and used by a particular population group, such as young adults and not the elderly. However, in this study 12.6% of the study participants were over 45 years old, indicating that indeed, the older subpopulation was well represented in this study. In all cases, the data collection using standard surveys at several hospitals, COVID treatment centres or vaccination centres across the country would have better covered this population. This approach is recommended for future studies.

This study intended to cover the most important features related to vaccination. Still, certain aspects related to COVID-19 vaccine hesitancy are missing from the study such as the type of the given vaccine. More comprehensive future studies, including longitudinal ones, are warranted to cover these aspects. Finally, the place of residence of the study participants was indicated as being in city versus villages. However, indicating the exact city within the country would have provided more information about the population of the study.

## Implications for public health

The findings are useful in developing and implementing effective vaccination strategies and programs targeting people who are hesitant to take the booster. Information regarding the safety of the vaccine should be monitored and communicated to the public on a regular base.[5, 12] This should be provided by trustable sources such as healthcare professionals and should be suitable for the different educational levels in Jordan.[5, 16, 31, 32] These measures will eliminate public concerns surrounding the safety of vaccination strategies against COVID-19.

# Conclusion

This is a large national study on people's attitude towards the COVID-19 booster dose in Jordan. This study found that more than 50% of Jordanians were hesitant to receive a COVID-19 booster vaccination. Differences in vaccine hesitancy to booster doses were based on many factors that include income, educational level, experiencing side effects and hearing news frequently.

# Author Contributions

All authors were contributed to the paper including data analysis, writing, and all other steps.

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## Conflict of Interest

None declared.

## Data Availability

Data will be available upon reasonable request.

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