

# Covid-19 vaccination hesitancy among Palestinian students

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## Abstract

Much of the existing literature on vaccine hesitancy and resistance focuses on the explicit reasons individuals justify their opposition to a particular vaccine or vaccination programs in general. We were therefore interested to assess vaccine hesitancy among university students in Palestine. A valid and reliable multi-item questionnaire was made available through social media to recruit Palestinian students. The survey was conducted between February and June 2021, and included socio-demographic information, knowledge and source of information about the disease, and attitudes towards COVID-19 conspiracy theories. The total number of respondents in this study was 840 students. Approximately 80% of the respondents were females, 5.8% of the respondents suffered from chronic diseases, and 38.9% of the respondents either suffered from COVID-19 or had a family member who did. The respondents' intention to receive the COVID-19 vaccine was as follows: 65% of males, 45% of females, 53% with chronic diseases, 48% without chronic diseases, and 51% of patients previously suffered from COVID-19. General intention to get the influenza vaccine was 315 (37.5%) of those surveyed. The general assumption that COVID-19 is a man-made disease was agreed by 390 (46%), with 66% of these respondents intending to be vaccinated. The overall intent to receive the COVID-19 vaccine was highest among students who were relying on scientific sources for their information about the vaccine (63%). Misinformation triggered by unregulated social media can have potentially serious repercussions on individuals and the community if it takes precedence over evidence-based guidelines.

## Introduction

The coronavirus disease (COVID-19), caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is causing significant morbidity and mortality.<sup>1</sup> The number of confirmed COVID-19 cases worldwide has exceeded 216 million, with approximately 4.5 million deaths according to the latest data from Johns Hopkins University.<sup>2</sup>

The research collected on COVID-19 has been revolutionary, particularly in the medical and biomedical sciences, where developing a vaccine is vital for the world to have a semblance of normalcy.<sup>3</sup> Vaccine development against SARS-CoV-2 was fierce and encompassed all potential approaches to make a safe and efficient vaccine available to the global community in the shortest possible time. The right choice of vaccine type, including carrier or vector, adjuvant, excipients, dosage form, and route of administration was critical. These factors can affect the induced immune responses, the resulting effectiveness against COVID-19, and the logistics of manufacturing, storage and distribution.<sup>4</sup>

The efforts of the scientific community in developing a vaccine for COVID-19 can be hampered by vaccine hesitation.<sup>5</sup> Hesitation about vaccinations can be influenced by health information from a variety of sources, including the internet and social media platforms. As access to technology has improved, social media has achieved global significance. Unlike traditional media, social media enables individuals to quickly create and share content worldwide without editorial control. Users can choose content streams themselves, which adds to ideological isolation. As such, there are significant public health concerns raised by anti-vaccination messages on these platforms. This can lead downstream vaccine hesitancy and compromise public confidence in future vaccine development for novel pathogens such as SARS-CoV-2.<sup>6</sup>

Online social networks have become fertile ground for the spread of false information, especially in light of the ongoing COVID-19 pandemic. Today more than ever, there is a great need for scientific fact-checking and exposure of the dangers social media tools pose in relation to COVID-19 through misinformation spreading.<sup>7</sup>

It is estimated that a novel COVID-19 vaccine must be accepted by at least 55% of the population to ensure herd immunity. Some estimates assume as many as 85% of the population may need to be vaccinated depending on the country and infection rates.<sup>8,9</sup> Achievement of these required vaccination rates should not be assumed as there is well-documented evidence of global hesitancy to use vaccines.<sup>10</sup> This is often triggered by online and offline misinformation about the importance, safety, or effectiveness of vaccines.<sup>11-13</sup> Incorrect information about the pandemic was often spread on social media platforms. Some of these rumours included tying 5G cellular networks to the virus, how respondents

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in vaccination attempts died after taking a COVID-19 vaccine candidate, and how the pandemic is a conspiracy.<sup>14-16</sup> Such information can build on pre-existing fears, create doubts and cynicism about new vaccines, and limit public acceptance of COVID-19 vaccines.<sup>17</sup>

Vaccine hesitation has been defined by the World Health Organization (WHO) Strategic Advisory Group of Experts on Immunization (SAGE) working group as behaviour influenced by questions of confidence, complacency, and expediency. Hesitation about the vaccine does not always lead to rejecting the vaccine, as hesitant people may accept certain vaccines but still have doubts about them.<sup>18</sup> Many factors are associated with vaccine hesitation, including age, gender, education, lack of vaccination, lower self-imposed risk of contracting the disease, lower fear of the disease, the belief that vaccines are not safe/effective, and increased concerns about the rapid development of certain vaccines.<sup>19</sup> Similarly, the link between the COVID-19 vaccine conspiracy and low intent to receive COVID-19 vaccines were shown in a previous study in public in Arab countries.<sup>20</sup> In Palestine, the total number of reported COVID-19 cases was approximately 337879, with more than 3775 deaths related to the disease as of June 03, 2021.<sup>2</sup> Since university students can be considered an insightful group of younger people, assessing their attitudes towards the COVID-19 vaccination requires special attention. Therefore, the objectives of the current study were to assess the general intent to receive the COVID-19 vaccine by university students in Palestine, the possible factors associated with higher COVID-19 vaccine hesitancy in the study group, the possible correlation between vaccine conspiracy notions and hesitation about COVID-19 vaccines, and the relationship between the source of knowledge about COVID-19 vaccines and their acceptance.

## Methods

This cross-sectional study was conducted using an online-based survey that took place between February to June 2021. The recruitment of respondents was through a published survey shared on different student Facebook groups. The target audience for inclusion in this study were students who are currently studying at Palestinian universities and whom are aged 18 years old or more.

This study is based on a survey that has four sections, each with 25 elements. The first section assessed student demographics and their previous experience with COVID-19. The second section included items that assessed belief in a conspiracy about the origin of COVID-19. In the third section, the main source of knowledge about COVID-19 vaccines was assessed. Finally, the fourth section was based on the short, previously validated Vaccine Conspiracy Beliefs Scale (VCBS) with minor changes to address issues related to COVID-19 vaccines.

Associations between categorical variables were assessed using the chi-square test. Statistical significance was considered as  $p < 0.05$  and all analyses were performed with IBM SPSS 22.0 for Windows.

## Results

The total number of respondents in this study was 840 students. Approximately 80% of the respondents were women, 5.8% of the respondents had chronic illnesses, 38.9% of the respondents either had COVID-19 themselves or had family member with the disease, 74.3% of the respondents were in medical school, and all

respondents were satisfactorily distributed over different levels of education (Table 1).

**Table 1.** Characteristics of survey respondents

Characteristics	Number (%)
<b>Sex</b>	
Male	174 (20.7)
Female	666 (79.3)
<b>Chronic diseases</b>	
Yes	49 (5.8)
No	791 (94.2)
<b>Experience of COVID-19</b>	
Yes	327 (38.9)
No	513 (61.1)
<b>Medical School</b>	
Yes	624 (74.3)
No	216 (25.7)
<b>Education level</b>	
1st year	172 (20.5)
2nd year	297 (35.4)
3rd year	216 (25.7)
≥4th year	155 (18.5)

**Table 2.** Analysis of respondent variables for possible association with intent to get COVID-19 vaccines

Variable	Features	Intent to be vaccinated			p-value
		Yes n (%)	No n (%)	May be n (%)	
Sex	Male	107 (65)	54 (33)	3 (2)	0.001
	Female	297 (45)	292 (43)	77 (12)	
	Total	404 (48)	346 (41)	(11 11)	
Chronic diseases	Yes	26 (53)	19 (39)	4 (8)	0.720
	No	378 (48)	327 (41)	86 (11)	
Experience of COVID-19	Yes	168 (51)	124 (38)	35 (11)	0.274
	No	236 (46)	222 (43)	55 (11)	
Medical School	Yes	319 (51)	241 (39)	64 (10)	0.011
	No	85 (39)	105 (49)	26 (12)	
Education level	1st year	73 (42)	75 (44)	24 (14)	0.002
	2nd year	123 (41)	141 (48)	33 (11)	
	3rd year	114 (53)	79 (37)	23 (10)	
	≥4th year	94 (61)	51 (33)	10 (6)	

**Table 3.** Analysis of respondent variables for possible association with intent to get influenza vaccines

Variable	Features	Intent to be vaccinated			p-value
		Yes n (%)	No n (%)	May be n (%)	
Sex	Male	64 (39)	92 (56)	8 (5)	0.724
	Female	251 (38)	359 (54)	56 (8)	
	Total	315 (38)	451 (54)	64 (8)	
Chronic diseases	Yes	23 (47)	22 (45)	4 (8)	0.366
	No	292 (37)	429 (54)	70 (9)	
Experience of COVID-19	Yes	124 (38)	172 (53)	31 (9)	0.812
	No	191 (37)	279 (54)	43 (9)	
Medical School	Yes	252 (40)	328 (53)	44 (7)	0.001
	No	63 (29)	123 (57)	30 (14)	
Education level	1st year	71 (41)	83 (48)	18 (11)	0.249
	2nd year	108 (28)	161 (41)	123 (31)	
	3rd year	72 (33)	123 (57)	21 (10)	
	≥4th year	64 (41)	84 (54)	7 (5)	

**Table 4.** Analysis of the five conspiratorial claims and their association with COVID-19 vaccine hesitancy

COVID-19 conspiratorial claims	Features	Intent to be vaccinated			p-value
		Yes n (%)	No n (%)	May be n (%)	
COVID-19 is man-made disease	Yes	256 (66)	97 (25)	37(9)	0.001
	No	73 (29)	150 (60)	28 (11)	
	May be	75 (38)	99 (50)	25 (12)	
COVID-19 was made to enforce vaccination	Yes	29 (24)	83 (69)	8 (7)	0.001
	No	324 (59)	170 (31)	55 (10)	
	May be	51 (30)	93 (54)	27 (16)	
COVID-19 vaccination intends to implant microchips into people	Yes	7 (8)	75 (84)	7 (8)	0.001
	No	359 (64)	160 (29)	42 (7)	
	May be	38 (20)	111 (58)	41 (22)	
COVID-19 vaccination will lead to infertility	Yes	2 (6)	31 (88)	2 (6)	0.001
	No	241 (69)	86 (25)	23 (6)	
	May be	161 (35)	229 (50)	65 (15)	
Generally, "anti-vaccines"	Yes	7 (6)	116 (92)	3 (2)	0.001
	No	393 (59)	203 (31)	68 (10)	
	May be	4 (8)	27 (54)	19 (38)	

**Table 5.** The modified vaccine conspiracy belief score and its association with COVID-19 vaccine hesitancy

General conspiratorial claims about vaccines	Features	Intent to be vaccinated			p-value
		Yes n (%)	No n (%)	May be n (%)	
Vaccine safety information is faked	No	173 (76)	39 (17)	15 (7)	0.001
	May be	211 (40)	248 (47)	70 (13)	
	Yes	20 (24)	59 (70)	5 (6)	
Vaccine efficacy information is faked	No	228 (81)	33 (12)	21 (7)	0.001
	May be	160 (38)	198 (47)	62 (15)	
	Yes	16 (12)	62 (45)	7 (5)	
Vaccines companies hide information about vaccine side effects	No	169 (74)	43 (19)	15 (7)	0.001
	May be	183 (49)	129 (35)	58 (16)	
	Yes	52 (41)	58 (46)	17 (13)	
Children vaccines information are faked and hidden	No	222 (70)	67 (21)	26 (9)	0.001
	May be	152 (38)	188 (48)	56 (14)	
	Yes	30 (23)	91 (70)	8 (6)	
Governments hide information about vaccines causing diseases	No	232 (70)	70 (21)	31 (9)	0.001
	May be	145 (35)	215 (52)	51 (13)	
	Yes	27 (28)	61 (64)	8 (8)	

**Table 6.** The intent to get COVID-19 vaccines, stratified by the main source of knowledge regarding COVID-19 vaccination

Source of information about COVID-19	Intent to be vaccinated			p-value
	Yes n (%)	No n (%)	May be n (%)	
Television	43 (46)	38 (41)	12 (13)	0.001
Social Media	150 (36)	213 (51)	51 (13)	
Scientists	211 (63)	95 (29)	27 (8)	

The association between intent to get vaccinated for COVID-19 and various variables is given in Table 2. The general intent to get a COVID-19 vaccination among respondents was as follows: yes (n = 404, 48.1%), no (n = 346, 41.2%) and maybe (n = 90, 10.7%). The respondents' intentions to get a COVID-19 vaccine were as follows: 65% of male, 45% of female, 53% of those with chronic diseases, 48% of those without chronic diseases, 51% of respondents who had experienced COVID-19, 46% of respondents who had not experienced COVID-19, 51% of medical school respondents, 39% of non-medical school respondents, and 61% of respondents in the 4th year or above.

Influenza vaccine hesitancy is a significant threat to global efforts to reduce the burden of seasonal and pandemic influenza. In Table 3, the intention to receive the influenza vaccine was assessed in association with several variables. The overall intention of respondents to get the influenza vaccine was 315 (37.5%). The respondents' intentions to get the influenza vaccine were as follows: 64% of male, 38% of female, 47% with chronic diseases, 37% of those without chronic diseases, 38% of those who had experienced COVID-19, 37% of those who had not experienced COVID-19, 40% of medical school respondents, 29% of non-medical school respondents and 41% of respondents in 1st and 4th year and above.

Among respondents to the study, the assumption about COVID-19 being a man-made disease was agreed by 390 (46%) respondents, of whom 66% plan to receive the vaccine (Table 4). Additionally, 24% of those respondents who believed that COVID-19 was made by humans to enforce vaccination will be vaccinated. Among respondents who rejected the claim that COVID-19 vaccination will implant microchips in people to control them, 64% will be vaccinated. Only 35 students (4%) believed the claim that COVID-19 vaccination could lead to infertility and 126 students (15%) were against vaccines in general; in this population, 6% will be vaccinated.

Table 5 discusses general conspiratorial claims about vaccines and the intent to receive the COVID-19 vaccine. Eighty-four (10%) respondents believed that vaccine safety information was fake and 24% of this group will be vaccinated. Among participants who believed the vaccine's effectiveness was fake, 12% will be vaccinated. In addition, 127 respondents believed that vaccine companies are hiding information about side effects of the vaccine, with 41% of these respondents intending to receive the vaccine. Regarding childhood vaccinations, 129 respondents believed that vaccine information for children was fake, and 96 respondents believed that governments are hiding information and are involved in the conspiracy.

The source of information and the intent to receive the COVID19 vaccine were investigated (Table 6). The overall intent to receive COVID-19 vaccines was the highest among students who received their information about the vaccine from scientific sources (63%), followed by TV programs and press releases (46%). The lowest intent to receive the vaccine was among those who got their information from social media (36%).

**Discussion**

Vaccination is the most successful public health measure. However, the hesitancy to use vaccines is increasing worldwide.<sup>21</sup> The WHO has selected vaccine hesitancy as one of the top ten major threats to global health.<sup>22</sup> A cross-sectional study was conducted on a sample of Palestinian university students to examine their attitudes towards being vaccinated University students were chosen as the study population as they are expected to be open-minded, educated, and quick to respond to public health issues.<sup>23</sup> Our sample was not intended to be representative of Palestinian university students, but rather to provide an initial and informative description.

There was a positive correlation between being male and the acceptance of the COVID-19 vaccination. Several independent reports showed a higher risk of COVID-19 complications, infectivity, and death in men.<sup>24</sup> No statistically significant difference was found

in respondents who experienced COVID-19 in themselves or their families ( $p$ -value = 0.274), and in respondents with chronic diseases ( $p$ -value = 0.720). Being a medical student and senior student (3rd and 4th year) were both tied to a higher intention to receive the COVID-19 vaccine. As older students are expected to have more knowledge compared to freshmen and medical students are more exposed to COVID-19 related information as part of the curriculum, this was an expected result.

The hesitation about influenza vaccines is a significant threat to global efforts to reduce the burden of influenza.<sup>25</sup> Despite the severity of influenza and the availability of safe vaccines, low influenza vaccine uptake rates within certain risk populations remain a challenge worldwide. The only factor significantly affecting the intention to receive the influenza vaccine was the respondents' course of study (medical versus non-medical) ( $p$ -value = 0.001). Gender, presence of chronic illnesses, one's own or family experience of COVID-19, and level of education were not significantly related with the intent to receive the influenza vaccine. The percentage of adults' intent to get influenza is quite low as influenza epidemics are a familiar annual occurrence. However, potential barriers to influenza vaccination need to be identified in order to inform measures to raise awareness acceptance of influenza vaccines.<sup>26</sup>

A recently published study showed that conspiracy theories about the COVID-19 pandemic are linked to risky, non-compliant behaviors.<sup>27</sup> Vaccination hesitancy has also been linked to conspiratorial, religious, and paranoid beliefs.<sup>28,29</sup> Suspicion of key members in the society such as government officials, academics and medical professionals has been linked to negative attitudes towards vaccination, as has the affirmation of authoritarian political views, social discontent, and intolerance towards immigrants.<sup>30,31</sup>

The conspiracy regarding COVID-19 being man-made was not surprising, as many reports supported the theory of a laboratory leak.<sup>32</sup> Two Chinese papers have been removed under a new policy requiring government approval to publish academic papers on COVID-19.<sup>32</sup> As the scientific community works to develop a vaccine against COVID-19, a small anti-vaccine group is mobilizing against it. Activists spread strange narratives: they falsely say that coronavirus vaccines are used to implant microchips in people and falsely claim that a woman who took part in a UK vaccine trial has died.<sup>33</sup> The majority of respondents believed that COVID-19 will not cause infertility and were not against the vaccine. The anti-vaccine movement has gained momentum over the past 50 years, leading the World Health Organization (WHO) to list vaccine hesitancy as one of the top ten global health threats in 2019.<sup>34</sup> Interestingly, the majority of respondents disagreed with the general conspiracy because they disagreed with all of the following: vaccine safety is fake, vaccine effectiveness is fake, vaccine companies hide information, vaccine information for children is fake, and governments hide information about vaccinations.

Anti-vaccine narratives aren't the only threat to a future COVID-19 vaccine. Social media has increasingly become a tool for disseminating misinformation, with groups exploiting anti-vaccine and anti-science sentiments, and promoting conspiracy theories.<sup>35</sup> Most of the respondents got their information from social media and a majority (51%) were unwilling to receive the vaccine, while 63% of those who received their information from

scientific sources were willing to be vaccinated. One report found that 31 million people followed anti-vaccine groups on Facebook, with 17 million people subscribing to similar content on YouTube.<sup>36</sup>

## Conclusion

The challenge for public health officials is compounded by the finding that anti-vaccine social media networks are highly interconnected and likely to decrease people's intent to be vaccinated. Other factors such as age, gender, and educational level affect respondents' beliefs. Our insights into social media as a source of information related to conspiracy beliefs add to this concern. As this survey was internet-based, it added a limitation to this study. We expect that further studies will allow more nuanced analyses regarding education effects and other variables.

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