

Research Article

Factors Predicting Compliance with the Uptake of the Third COVID-19 Vaccine among the Arab Minority in Israel

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Between December 2020 and February 2021, Israel administered two doses of COVID-19 vaccine to >50% of its adult population. Nonetheless, due to declining immunity and the spread of the COVID-19 delta variant, the government offered a third COVID-19 vaccine dose in July 2021. Although the vaccine was shown to provide effective protection against severe illness, the compliance rate among the Arab minority remained low. The present study sought to identify the factors predicting willingness to uptake the COVID-19 vaccine in the Arab community. An online survey of 2486 participants was conducted in November 2021 to assess vaccination-related behaviours, such as perceived benefits, barriers, incentives (e.g., the green pass), subjective norms, and pandemic fatigue. Positive correlations were found among reasons for obtaining a green pass, trust in formal authorities, perceived effectiveness of the third COVID-19 vaccine dose, subjective norms, and attitudes toward the booster dose. Pandemic fatigue was positively correlated with vaccination barriers. Trust in authorities, perceived booster dose effectiveness, subjective norms, and attitudes were negatively related to pandemic fatigue and barriers to vaccination. Demographic variables such as age, education level, and income level were positively related to odds of getting the booster. Participants who reported being religious exhibited a lower rate of booster dose compliance than secular participants. The study findings show that the reasons for acquiring a green pass were positively correlated with the perceived effectiveness of the booster dose, demonstrating that individuals understood the vaccine benefits. Further, having a green pass was negatively related to barriers. Incentives such as the green pass play a major role in encouraging the population to take the COVID-19 vaccine. In addition, public campaigns to explain the health benefits and refute erroneous myths support higher vaccination rates.

1. Introduction

The global COVID-19 pandemic broke out in late 2019 and has continued to persist for over two years [1]. The virus that causes the COVID-19 disease has the ability to spread quickly and at unprecedented levels. Efforts to find measures to control and prevent the spread of this infectious disease led to the development of the COVID-19 vaccine [2]. Studies have found the COVID-19 vaccine to be safe, with insignificant adverse events. The reported advantages of the COVID-19 vaccine include protection from the severe risks the disease poses to unvaccinated individuals [3].

In the period from December 2020 through April 2021, Israel vaccinated over half its adult population (53%) with

two doses of the Pfizer BNT162b2 COVID-19 vaccine (MOH online information center, 30.3.2021). By June 2021, this proactive approach had successfully reduced the number of new daily confirmed cases to single-digit values [4]. Israel subsequently lifted restrictions designed to reduce the spread of the disease. Yet by the end of July 2021, Israel exhibited a rapid surge in COVID-19 morbidity due to the delta variant of COVID-19, initiating the country's fourth wave of the pandemic [4]. During this fourth wave, a decrease in immunity was detected among adults who had received their first and second doses of the vaccine seven months earlier [5]. As a consequence, on July 30, 2021, the government began offering a third COVID-19 vaccine, even before the United States Food and Drug Administration

(FDA) announced its approval of the third COVID-19 vaccine [6].

By the end of 2021, the third COVID-19 vaccine was found to have replenished protection and reduced the risk of infection or severe morbidity [6, 7]. The immunization rate reached over 70% of adults over the age of 60 and about 50% of adults between the ages of 40 and 59, whereas this rate was only 30% for individuals between 18 and 39 years old. The MOH issued a “green pass” document (valid as a COVID certificate) to those who took the second COVID-19 vaccine. Individuals holding a green pass were allowed to enter various locations, for example public events, and did not have to isolate after returning from traveling abroad. The government’s health authorities hoped that the green pass initiative would serve as an extra means of encouraging the public to get vaccinated and that vaccination would protect people from a severe course of the disease [8].

Reports show that COVID-19 vaccine uptake in several Middle Eastern countries (e.g., Jordan, Lebanon, Iran, Saudi Arabia, and Iraq, with uptake rates of 17.1%, 18.5%, 20%, 29.4%, and 34.7%, respectively) is lower than the WHO’s target of 40% vaccine coverage by the end of 2021. Trust in the health authorities and government institutions was considered to be the main factor contributing to reduced COVID-19 vaccine compliance [9].

Sallam et al. [10] assessed worldwide reports of vaccine hesitancy regarding primary doses of the COVID-19 vaccine. The intention rate may vary due to several factors, such as free vaccination versus vaccination that the public must pay for, trust in pharmaceutical companies due to accelerated mass production of vaccines, and evidence of vaccine safety and efficacy. This narrative review (of 114 countries) identified the following countries as having the highest rates of COVID-19 vaccine compliance: Vietnam, Niger, Tunisia, and Canada (97%, 93%, 92%, and 91% respectively), while the lowest compliance rates were found in Senegal, Bahrain, Cameroon, and Iraq (21%, 17%, 15%, and 13% respectively).

A systemic review by Abdelmonein et al. [11] analysing 48 studies examining acceptance rates of the third COVID-19 vaccine also revealed global differences. For example, studies conducted in the Eastern Mediterranean and Southeast Asian regions showed 59% and 52% acceptance, whereas the levels in the Western Pacific and European regions were higher, e.g., 89% and 86%, respectively.

Despite the immunization achievements of the nationwide third COVID-19 vaccine inoculation campaign, data reported by the Israeli Ministry of Health showed minimal compliance and a low vaccination rate among the Arab population [4]. Moreover, 40% of the newly confirmed cases among individuals who had not had the third COVID-19 vaccine dose were people of Arab ethnicity, a number that is disproportional to the percentage of Arabs in Israel’s population (21%) [6].

On average, the socioeconomic status of the Arab minority in Israel is lower than that of the Jewish population [12, 13]. Studies worldwide have shown high morbidity and mortality rates from COVID-19 among ethnic minorities [14–16]. Distrust of the effectiveness of the COVID-19 vaccine was shown to be a factor contributing to the low vaccine uptake rate and hence increased incidence of the

disease, resulting in high morbidity and mortality rates [17, 18].

The health belief model (HBM) may help in understanding the factors that affect vaccination compliance [19, 20]. This model encompasses variables such as perceived threat and perceived barriers. Research has demonstrated that individuals who perceive they are at minimal risk of a disease exhibit lower levels of vaccination compliance [21, 22]. Several factors have been proposed to explain vaccination compliance. The theory of planned behaviour (TPB) [23] can be used as a tool for understanding the factors associated with COVID-19 vaccine compliance. Ajzen defined subjective norms as “(a person’s) values and wishes to adhere to a certain action through observation of the way others expect the individual to behave.” According to TPB, an individual’s intentions to execute health behaviours are affected by attitudes toward a certain behaviour [24]. Trust in healthcare providers has also been shown to have a positive influence on an individual’s decision to get vaccinated [25]. Trust also contributes to people’s confidence in the health system’s vaccine promotion campaigns [26, 27]. The WHO coined the term “pandemic fatigue” to describe the widespread stress among the population in response to a lengthy crisis with no end in sight [1]. This fatigue desensitizes people’s awareness of the pandemic’s severity and thus overrides their belief in the necessity to conform to guidelines.

In line with the HBM, Khatib et al. [28] reported that individuals who perceived they were highly likely to be infected with COVID-19 and suffer its severe health consequences exhibited better adherence to protective guidelines and were more likely to be willing to get vaccinated [29–31]. Other studies have found that vulnerability to COVID-19 does not predict whether an individual intends to get vaccinated [32, 33]. In contrast, perceived vaccine effectiveness is a reliable predictor of vaccination compliance [34].

Studies have identified several mental “barriers” that cause people to avoid getting the COVID-19 vaccine: fear of safety in COVID-19 vaccine production, questions regarding the vaccine’s efficacy, and possible side effects [24, 35, 36]. Additional barriers emerge from living in rural areas, as is the case for more than 50% of the Arab minority in Israel. Hence, fewer vaccination clinics are available, and the population has less access to these clinics [37].

Vaccinations are among the most effective public health strategies for reducing morbidity from infectious diseases. The fourth wave of COVID-19 in Israel was nicknamed “the pandemic of the unvaccinated” in view of the fact that about 90% of Arab hospitalized individuals were unvaccinated [6]. Based on the above, it is of great importance to investigate the factors contributing to compliance to the third dose of the COVID-19 vaccine, among the Arab minority in Israel.

2. Materials and Methods

2.1. Questionnaire. This cross-sectional study was conducted as an online survey in November 2021. The questionnaire was disseminated via social networks (Facebook

and WhatsApp) using the snowball method. Because participation was voluntary, no incentives were offered. This questionnaire included seven parts that were adapted from existing validated questionnaires [38, 39] to fit the present research (Appendix 1 in supplementary materials).

2.1.1. Perceived Benefits, Barriers, and Incentives of the Vaccine. Perceived benefits, barriers, and incentives of the vaccine were assessed based on the HBM [40]. The perceived benefits were assessed with items such as “The third dose of the anti-COVID-19 vaccine will enable me to return to normal life, including traveling abroad and going to restaurants and weddings”; “The green pass (a document issued upon getting the third COVID-19 vaccination) will allow me to continue working.” The perceived barriers were assessed using items such as “I am afraid of a vaccine that has only been available to the public less than one year”; “I am afraid of a vaccine that was developed so fast, without sufficient information about safety and quality control.” Respondents reported on a Likert scale ranging from 1 (do not agree at all) to 5 (agree very much).

2.1.2. Subjective Norms and Attitudes. Subjective norms and attitudes were based on TPB [41, 42]. Subjective norms were evaluated by five items, such as “Most of the people I know believe the third dose of the anti-COVID-19 vaccine is effective in preventing infection” “Most people in my town are afraid that the third dose is not safe.” Attitudes about the COVID-19 vaccine were assessed by six items, such as “I believe the third dose of the anti-COVID-19 vaccine will not prevent the disease”; “I believe the third dose of the anti-COVID-19 vaccine can cause severe adverse effects.” Attitudes related to the green pass were examined by four items, such as “The green pass is a means of forcing people to get vaccinated.”

2.1.3. Reasons for Acquiring a Green Pass. Reasons for acquiring a green pass were assessed using five items related to employment aspects, such as “I need the green pass because it was mandated by my workplace.”

2.1.4. Trust in Formal Authorities. Trust in formal authorities included six questions that evaluated people’s trust in the authorities (such as the MOH and the government) leading the strategies for coping with the coronavirus in Israel.

2.1.5. Pandemic Fatigue. Pandemic fatigue was estimated by eight statements based on the WHO’s recommendations [43] for establishing a policy to assist countries worldwide in dealing with pandemic fatigue. Sample items include “The green pass guidelines change frequently and are fatiguing, confusing, and exaggerated.”

2.1.6. Health Status and Subjective Health Evaluation. Respondents were asked to evaluate their general health on a scale from 1 to 5, where 1 is not good and 5 is excellent.

Respondents were also asked whether they take medications for chronic illness (yes/no).

2.1.7. Demographic Data. Respondents were asked to report their personal details such as age, gender, marital status, number of children, education, type of employment, income level, and religion. Religiosity was defined as follows: a religious person is someone who is very careful to fulfil the requirements and rules of the religion and lives according to these rules, whereas a somewhat religious person is someone who intends to fulfil only some of the religion’s requirements and rules. Moreover, respondents reported their COVID-19 vaccination status by specifying one of the following: three vaccine doses; two doses and recovery from COVID-19 infection; one dose and recovery from COVID-19; and none of the above.

The items were translated from English into Arabic by a professional translator and then back-translated into English to ensure accuracy. The introduction to the survey explained the purpose of the study and ensured participant anonymity.

2.2. Variables

2.2.1. Dependent Variable. The dependent variable comprised vaccination status and green pass eligibility. Three groups were defined: (a) received the (third COVID-19 vaccine dose); (b) was issued a green pass without getting the third COVID-19 vaccine dose (i.e., had one or two vaccine doses and was infected by COVID-19); and (c) was not issued a green pass (i.e., was not vaccinated and not infected by COVID-19).

2.2.2. Independent Variables. The independent variables were as follows:

- (i) Reasons for a green pass, measured by five items, $\alpha = 0.73$. A higher score indicated a greater need for the green pass.
- (ii) Trust in formal authorities, measured by six items, $\alpha = 0.86$. A higher score indicated greater trust in formal authorities.
- (iii) Pandemic fatigue, measured by eight items, $\alpha = 0.91$. A higher score indicated a higher level of pandemic fatigue.
- (iv) Effectiveness of third COVID-19 vaccine dose, measured by eight items, $\alpha = 0.91$. A higher score indicated greater perceived effectiveness of the third COVID-19 vaccine.
- (v) Barriers to vaccination, measured by two items, $r = 0.75$ ($p < 0.001$). A higher score indicated larger barriers to getting the third COVID-19 vaccine.
- (vi) Subjective norms, measured by five items, $\alpha = 0.80$. A higher score indicated more positive subjective norms regarding the third COVID-19 vaccine.
- (vii) Attitudes toward the third COVID-19 vaccine dose, measured by six items, $\alpha = 0.85$. A higher score

indicated more positive attitudes toward the third COVID-19 vaccine.

2.3. Data Analysis. The data were analysed using SPSS ver. 28. Descriptive statistics were used to represent the participants' demographic characteristics and the research variables. Pearson correlations were calculated to assess the associations among the research variables. The relationships between the categorical dependent variable of the group ((a) received third COVID-19 vaccine, (b) was issued the green pass without a third COVID-19 vaccine, and (c) was not issued the green pass) and the background demographic variables were assessed by multinomial logistic regressions for continuous demographic variables (e.g., age) and Chi-square analyses for categorical demographic variables (e.g., level of education and religiosity). A multinomial logistic regression was calculated between group membership and the study variables, while controlling for age (continuous) and for level of education, religiosity, and income level (categorical). Due to sample size, the significance level was set at $p < 0.01$.

3. Results

3.1. Participants. The questionnaire was completed by 2486 Israeli Arab adults. Most of the participants were Muslims (about 86%), women (about 92%), married (about 67%), and somewhat religious (about 66%) or religious (about 25%). Their mean age was about 30 years ($SD = 10.14$). About half of the participants had children, and about half resided in rural localities (with fewer than 20,000 residents). Most of the participants held an academic degree or were students in higher education (about 69%), and about half were employed. More than 50% reported that their family income is below the average, and about a third reported an average family income. Their subjective health was generally very good or excellent (about 80%), and only about one-tenth were reported using daily medications (Table 1).

Participants were asked about their vaccination and green pass status. Most stated that they were vaccinated and/or eligible for a green pass ($n = 1879$, 75.6%), according to the following distribution: received the third COVID-19 vaccine dose ($n = 1257$, 50.6%), received one or two vaccine doses and were infected by COVID-19, or received the second vaccine dose less than six months ago ($n = 622$, 25.0%). About a quarter of those in the sample were not vaccinated and were ineligible for a green pass ($n = 607$, 24.4%).

Means for the study variables were generally at about midscale (range 1–5) (Table 2). Most of the means were a bit higher than midscale, especially for perceived effectiveness of the third COVID-19 vaccine dose, pandemic fatigue, and barriers to vaccination. The mean for level of trust in formal authorities was a bit below midscale. Most correlations between the study variables were significant and moderate. The correlations among reasons for obtaining the green pass, trust in formal authorities, perceived effectiveness of the third COVID-19 vaccine dose, subjective norms, and

TABLE 1: Participants' sociodemographic characteristics ($N = 2486$).

Characteristics	N (%)
<i>Mean age, years (SD), range</i>	29.92 (10.14), 19–77
19–24	961 (38.7)
25–34	893 (35.9)
35 and higher	632 (25.4)
<i>Gender</i>	
Female	2297 (92.4)
Male	189 (7.6)
<i>Marital status</i>	
Married, intimate relationship	1713 (68.9)
Single	718 (28.9)
Divorced, widow	55 (2.2)
Children, yes	1271 (51.1)
Mean number of children (SD), range ($n = 1268$)	2.63 (1.30), 1–9
<i>Religion</i>	
Muslim	2140 (86.1)
Christian	242 (9.7)
Druze	89 (3.6)
Other	15 (0.6)
<i>Religiosity</i>	
Secular	230 (9.3)
Somewhat religious	1634 (65.7)
Religious	622 (25.0)
<i>Residence (n = 2461)</i>	
Urban	1161 (47.2)
Rural	1300 (52.8)
<i>Education</i>	
High school (some or full)	405 (16.3)
Higher professional education	358 (14.4)
Academic student	615 (24.7)
Academic graduate	1108 (44.6)
<i>Employment</i>	
Employed	1166 (46.9)
Leave of absence (due to COVID)	381 (15.3)
Unemployed	143 (5.7)
Student	280 (11.3)
Other	516 (20.8)
<i>Type of employment</i>	
In the health system	452 (18.2)
In the education system	701 (28.2)
Forced by workplace to be vaccinated	942 (37.9)
<i>Family income</i>	
Below average	1345 (54.1)
Average	808 (32.5)
Above average	333 (13.4)
<i>Subjective health</i>	
Very good/excellent	1978 (79.6)
Good	373 (15.0)
Reasonable/not good	135 (5.4)
Daily medication	277 (11.1)

attitudes toward the booster dose were all positive. Another positive correlation was found between pandemic fatigue and barriers to vaccination. The first set of variables mentioned above (excluding reasons for the green pass) was negatively related to the second set of variables.

The relationships between the dependent variable (groups: (a) received third COVID-19 vaccine, (b) was issued a green pass without third COVID-19 vaccine, and (c)

TABLE 2: Means, standard deviations, and intercorrelations between HBM and TPB variables ($N = 2486$).

	M (SD)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Reasons for a green pass	3.58 (1.13)	0.13*	0.01	0.41*	0.01	0.19*	0.14*
(2) Trust	2.68 (0.93)		-0.45*	0.44*	-0.32*	0.41*	0.37*
(3) Pandemic fatigue	3.67 (0.98)			-0.25*	0.47*	-0.34*	-0.52*
(4) Effectiveness of third COVID-19 vaccine dose	3.70 (1.06)				-0.34*	0.55*	0.56*
(5) Barriers	3.74 (1.27)					-0.34*	-0.62*
(6) Subjective norms	3.25 (0.93)						0.51*
(7) Attitudes toward third COVID-19 vaccine dose	3.20 (1.11)						

Vaccination/green pass: 1=yes, 0=no. Other variables: scale 1-5. * $p < 0.001$. HBM: health belief model, SD: standard deviation; TPB: theory of planned behaviour.

was not issued a green pass) and the demographic characteristics were examined in order to identify which demographic variables needed to be controlled for in further analyses. Age was positively related to the odds of receiving the third COVID-19 vaccine dose vs. not being issued a green pass (OR = 1.03, $p < 0.001$, 95% CI = 1.02, 1.04) as well as to the odds of receiving the third COVID-19 vaccine dose vs. being issued a green pass without the third COVID-19 vaccine dose (OR = 1.03, $p < 0.001$, 95% CI = 1.02, 1.04).

Level of education (high school and professional education vs. academic education or being a student at an academic institution) was related to the group variable ($\chi^2(2) = 82.04$, $p < 0.001$), such that a higher percentage of participants with an academic education or in the process of acquiring one received the third COVID-19 vaccine dose ($n = 962$, 55.8%), compared to those with a high school or professional education ($n = 295$, 38.7%).

Religiosity (secular, somewhat religious, and religious) was related to the group variable ($\chi^2(4) = 18.60$, $p < 0.001$), such that a higher percentage of secular participants received an academic education or in the process of acquiring one received the third COVID-19 vaccine dose ($n = 144$, 62.6%), compared with religious participants ($n = 287$, 46.1%).

Finally, income level (below average, average, and above average) was related to the group variable as well ($\chi^2(4) = 42.13$, $p < 0.001$), such that a higher percentage of participants with an above average income received the third COVID-19 vaccine dose ($n = 212$, 63.7%), compared with participants with a below average income ($n = 612$, 45.5%).

The other relationships either were not significant (marital status: $p = 0.026$, having children: $p = 0.171$, type of residence: $p = 0.648$, and subjective health: $p = 0.311$), or the demographic variables exhibited low variance (e.g., gender, religion, and daily medication). Thus, the study hypotheses were examined while controlling for age, level of education (0-high school and professional education, 1-academic education, or student at an academic institution), religiosity (1-secular, 2-somewhat religious, and 3-religious), and income level (1-below average, 2-average, and 3-above average).

The relationships between the study variables and variable of vaccination/being issued a green pass were examined by a multinomial logistic regression. The control variables listed above were entered first. The independent variables included reasons for being issued a green pass, trust in

formal authorities, pandemic fatigue, perceived effectiveness of the third COVID-19 vaccine dose, barriers to vaccination, subjective norms, and attitudes toward the booster dose. The 0.01 criterion of statistical significance was employed in all tests. The model was found to fit the data ($\chi^2(26, N = 2486) = 897.19$, Nagelkerke $R^2 = 0.35$, $p < 0.001$). Parameter estimates are shown in Table 3.

The results show that some of the variables are either related or unrelated to all group comparisons, whereas others make unique contributions in some but not all comparisons. Unlike the variable of not being issued a green pass, the variable of receiving the third COVID-19 vaccine dose was significantly related to reasons for obtaining the green pass, perceived effectiveness of the third COVID-19 vaccine dose, barriers to vaccination, subjective norms, and attitudes toward the third COVID-19 vaccine dose. Hence, the odds of obtaining the third COVID-19 vaccine dose (compared to not being issued a green pass) were higher for participants who had a greater need for the green pass, perceived the third COVID-19 vaccine dose to be more effective, had fewer barriers to vaccination, and had more positive subjective norms and attitudes regarding the third COVID-19 vaccine dose. Being issued a green pass without getting the third COVID-19 vaccine dose (compared to not being issued a green pass) was significantly related to reasons for obtaining a green pass, barriers to vaccination, and attitudes toward the third COVID-19 vaccine dose. Hence, the odds for being issued a green pass without the third COVID-19 vaccine dose (versus not being issued a green pass) were higher for participants who had a greater need for the green pass, had lower vaccination barriers, and had more positive attitudes toward the third COVID-19 vaccine dose. Finally, obtaining the third COVID-19 vaccine dose (compared to being issued the green pass without the third COVID-19 vaccine dose) was significantly related to perceived effectiveness of the third COVID-19 vaccine dose, barriers to vaccination, and subjective norms regarding the third COVID-19 vaccine dose. Hence, the odds for obtaining the third COVID-19 vaccine dose (versus being issued the green pass without the third COVID-19 vaccine dose) were higher for participants who perceived the third COVID-19 vaccine dose to be more effective, had lower barriers to vaccination, and had more positive subjective norms regarding the third COVID-19 vaccine dose.

In summary, the reasons for obtaining a green pass and attitudes toward the third COVID-19 vaccine dose were

TABLE 3: Parameter estimates for multinomial logistic regression of vaccination/green pass group membership, with variables of HBM and TRA theories ($N = 2486$).

	B (SE)	OR (95% CI)	<i>p</i>
Received third COVID-19 vaccine vs. no green pass			
Reasons for a green pass	0.36 (0.06)	1.44 (1.28, 1.61)	<0.001
Trust	0.01 (0.08)	1.01 (0.87, 1.18)	0.881
Pandemic fatigue	-0.10 (0.07)	0.90 (0.79, 1.03)	0.135
Effectiveness of third COVID-19 vaccine dose	1.05 (0.08)	2.86 (2.43, 3.38)	<0.001
Barriers	-0.36 (0.07)	0.70 (0.61, 0.80)	<0.001
Subjective norms	0.30 (0.07)	1.35 (1.18, 1.53)	<0.001
Attitudes toward third COVID-19 vaccine dose	0.36 (0.08)	1.44 (1.23, 1.68)	<0.001
Green pass without third COVID-19 vaccine vs. no green pass			
Reasons for a green pass	0.26 (0.06)	1.30 (1.16, 1.45)	<0.001
Trust	0.10 (0.08)	1.10 (0.95, 1.28)	0.214
Pandemic fatigue	-0.09 (0.07)	0.92 (0.80, 1.05)	0.227
Effectiveness of third COVID-19 vaccine dose	0.16 (0.08)	1.17 (1.01, 1.36)	0.035
Barriers	-0.18 (0.07)	0.83 (0.73, 0.95)	0.007
Subjective norms	0.03 (0.07)	1.03 (0.90, 1.18)	0.683
Attitudes toward third COVID-19 vaccine dose	0.27 (0.08)	1.31 (1.11, 1.53)	<0.001
Received third COVID-19 vaccine vs. green pass without third COVID-19 vaccine			
Reasons for green pass	0.10 (0.05)	1.11 (0.99, 1.23)	0.067
Trust	0.11 (0.07)	1.14 (0.97, 1.28)	0.121
Pandemic fatigue	-0.01 (0.06)	0.98 (0.87, 1.11)	0.811
Effectiveness of third COVID-19 vaccine dose	0.89 (0.08)	2.44 (2.08, 2.85)	<0.001
Barriers	-0.18 (0.05)	0.84 (0.75, 0.93)	0.002
Subjective norms	0.27 (0.06)	1.31 (1.16, 1.48)	<0.001
Attitudes toward third COVID-19 vaccine dose	0.10 (0.07)	1.10 (0.95, 1.27)	0.197

B: unstandardized coefficient; SE: standard error; OR: odds ratio; 95% CI: 95% confidence interval for the odds ratio. Control variables are not presented for reasons of clarity.

related to having been vaccinated at least once and being issued a green pass (versus being ineligible for a green pass). Perceived effectiveness of the third COVID-19 vaccine dose and subjective norms regarding the third COVID-19 vaccine dose were related to obtaining the third COVID-19 vaccine dose, regardless of whether or not the individual had been issued a green pass. Barriers to vaccination were related to all three group comparisons, while trust in formal authorities and pandemic fatigue were unrelated to any of the group comparisons.

4. Discussion

In the present study, participants affiliated with the Arab population in Israel were surveyed online regarding their COVID-19 vaccination status. The purpose of the study was to examine and analyse factors associated with predictions of compliance with the third COVID-19 vaccine dose of the COVID-19 vaccine. In view of concerns about the spread of the delta variant of COVID-19, Israel was one of the first countries in the world to recommend and offer its residents a third dose of the mRNA COVID-19 vaccine, free of charge, to achieve better immunity. Nevertheless, the public response was lower than for the initial two doses [6].

Reasons attributed to this reduced compliance were related to pandemic fatigue, barriers, subjective norms, and attitudes. The public reacted to the continued presence of the pandemic through reduced adherence to MOH guidelines (wearing masks and social distancing). In addition, the mild

weather during the autumn season enabled the population to remain outdoors and thereby overlook the danger imposed by the virus surge. Moreover, barriers such as lower availability of vaccination clinics (e.g., shorter opening hours) gave a wrong impression of reduced urgency. Finally, myths regarding side effects related to decreased fertility that were spread via various internet media may have contributed to COVID-19 vaccination hesitancy [44–46].

In addition, among the respondents, more than 74% were young adults between 19 and 34 years old. Although everyone was vulnerable to infection, people in this age group tended to disregard the pandemic threat, believing that the elderly population was the only group to experience high morbidity and mortality. Most of the participants (>90%) indicated that they were in good to excellent health, therefore minimizing their need for vaccination.

Upon witnessing the slow uptake of the third vaccination dose, the government issued a green pass to those who got the third COVID-19 vaccine shot in an attempt to raise the vaccination rate. The green pass served as a ticket of admission to indoor venues and events. The results of this study show that the need for a green pass may have played a role in individuals' decision to get the third COVID-19 vaccine [47]. Furthermore, individuals who took the third dose and were entitled to a green pass along with a COVID-19 vaccination certificate were allowed to travel abroad and were required to remain in isolation for a shorter period of time upon their return.

Women with children who constituted more than 51% of the participants reported a mean of 2.63 children per household. These data may suggest that the mothers among the 50% who were immunized with a third COVID-19 vaccine dose (Table 1) wished to stay healthy in order to care for their children, in addition to their need to continue working to supplement the family income. In the self-reported survey, 37.9% of participants disclosed that their workplace had forced them to get vaccinated. Moreover, those working in the health and education systems were mandated by the authorities to get vaccinated.

At the time of the survey (November 2021), kindergartens and schools remained open. Because young children under the age of five were not eligible for vaccination [48, 49], educational institutions posed a risk of outbreaks [50]. This may have served as a drive factor for parents in complying with the third COVID-19 vaccine dose to shield themselves against contracting the infectious COVID-19 disease, avoid legally mandated isolation periods, and avoid missing working days.

It is interesting to note that although the nationwide average for third COVID-19 vaccine dose coverage among individuals aged 19–39 was 30%, participants in the present study reported a 50% coverage rate, even though 74% of the respondents were within the 19–34 age range. These results may be explained by the fact that about 46% of the participants were employed in the health and education systems in jobs entailing contact with the public. Thus, they were among the 38% who were “forced” by their workplace to take the third vaccine dose.

The current findings demonstrate that the reasons cited for obtaining a green pass positively correlated with perceived effectiveness of the third COVID-19 vaccine dose, indicating that individuals understood the vaccine benefits (as explained by the HBM). Having a green pass exhibited a negative relationship with barriers.

The present study demonstrated that those with higher education levels were more likely to get the third COVID-19 vaccine, perhaps because they were better able to understand the authorities’ scientific recommendations. In line with the findings of the present study, assessments of public acceptance of the third COVID-19 vaccine dose in the United Arab Emirates [51] indicate that respondents with a higher level of education were more willing to take the third COVID-19 vaccine dose. In contrast, a study by Chang et al. [52] surveying willingness to accepting the third COVID-19 vaccine in Malaysia reported that people with higher educational levels and healthcare professionals were less willing to accept the third COVID-19 dose. One possible explanation for these contradicting results may be that highly educated individuals wanted more investigational/experimental proof regarding the safety and efficacy of the third COVID-19 vaccine dose. Sun et al. [53] examined acceptance of a third COVID-19 vaccine dose among Chinese people and found no significant difference in the educational level between individuals who agreed to receive the third COVID-19 vaccine and those who did not agree.

Al Janabi and Pino [54] surveyed medical students in New York regarding their intentions to uptake the third

COVID-19 vaccine dose. The researchers explored participants’ attitudes about getting the third COVID-19 vaccine dose, given the high rate of first dose coverage and the minimal hesitancy reported. Yadete et al. [55] also examined factors associated with third COVID-19 vaccine compliance. Hesitancy was related to low trust, education, and insufficient information. In a January 2021 survey of 36,220 participants, Qunaibi et al. [56] found a high rate of COVID-19 vaccination hesitancy (83%) among residents of Arab countries. Al-Qerem and Jarab [57] assessed Jordanians’ intentions to be vaccinated with the COVID-19 vaccine. Their findings revealed that 36.8% participants had no intention to get vaccinated, while 26.4% were “unsure.” Moreover, a study by Al-Qerem et al. [58] examining Jordanian adults’ willingness to accept the third COVID-19 vaccine dose found hesitancy. Green et al. [59] compared factors related to COVID-19 vaccine uptake between Arab and Jewish populations in Israel during October 2020. Hesitancy was higher among Arab men (29.9%) than among Jewish men (7.7%), and 41.0% of Arab women rejected the vaccine compared to 17.2% of Jewish women.

Qunaibi et al. [56] examined attitudes toward the need for COVID-19 vaccination and found that distrust and concerns about side effects were among the reasons for refusal among the Arab population. Jordanian participants’ concerns about the COVID-19 vaccine focused mainly on the lack of trust [57]. Reasons cited by the Jordanian population regarding their negative attitude toward the third COVID-19 vaccine were related to the unproven benefits of the vaccine, disbelief in pharmaceutical companies, and fear of side effects [58]. In Israel, a national cross-sectional study by Green et al. [59] conducted prior to COVID-19 vaccine availability demonstrated that media misinformation regarding the rapid development and novelty of RNA vaccines played a role in the public’s attitudes, resulting in vaccine hesitancy.

5. Study Limitations

Limitations of the study include the low representation of male participants and the reporting method. The sample included 7.4% male responders, a ratio that is disproportional to their share of the population (50.6%) [60]. A future survey should be conducted that includes participants representing the normal distribution of gender in the population as well as a wider age range. In addition, the self-reporting method may be a limitation due to the possibility of information bias and the risk of social desirability bias, whereby individuals express an opinion others expect to hear. The dynamic nature of the pandemic may make it impossible to generalize some of the study’s findings beyond the time of the study. Nevertheless, these findings could be taken into consideration during future medical crises. Moreover, the snowballing method has limitations, among them selection bias, overrepresentation of specific groups, and online platforms are more accessible to the 19–34-year-old age group, which constituted 74% of the respondents. The use of the internet may have been a limitation for particular groups. Nevertheless, during the

COVID-19 pandemic, the internet use became prevalent to avoid the risk of infection. Future research should obtain information by additional methods, such as the use of face-to-face interviews and official documentations from health services providers (HMO).

6. Conclusions

Among the Arab minority in Israel, achieving population coverage in a COVID-19 vaccination program depends upon incentives such as the green pass to enhance compliance rates. In addition, individuals who were not mandated by their workplace to get the COVID-19 vaccine should be encouraged through better explanations of vaccine effectiveness and lower barriers.

Data Availability

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Additional Points

What Is Known about the Topic? (1) Vaccination rates of the third COVID-19 vaccine in the Arab population in Israel are low compared to the rest of the population. (2) The public's distrust in the effectiveness of the COVID-19 vaccine is a major factor contributing to the noncompliance of the vaccine uptake and may also result in higher morbidity and mortality from the virus. (3) Mental barriers and unavailability of vaccines cause low rates of vaccination against COVID-19. *What Does This Research Add?* (1) Describes effective benefits that encourage people to vaccinate. (2) In the context of the Arabs in Israel, trust in the authorities develops to become critical in the case of compliance with vaccinations for COVID-19. (3) Among the Arabs in Israel, the decision to receive the vaccine against COVID-19 is influenced by a variety of factors that were examined, including cultural and religious factors.

Ethical Approval

The study was performed in line with the principles of the Declaration of Helsinki. Approval was obtained from the Institutional Review Board of the Yezreel Valley Academic College (no. 123/2021).

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Supplementary Materials

Appendix 1: the research questionnaire. (*Supplementary Materials*)

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