

CROSS SECTIONAL STUDY

Attitudes and Acceptance of the Palestinian Population towards COVID-19 Health Precautions and Vaccinations: A Cross-Sectional Study

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Abstract: Background: COVID-19 is a new pandemic and the best protection against this infection is by vaccination.

Aims: This study aims to assess the commitment to COVID-19 health precautions and willingness to receive vaccination among the Palestinian population.

Methods: An online-based survey was carried out for an observational cross-sectional study. A total of 1367 participants were recruited conveniently between February and June 2021. To carry out comparisons, Mann-Whitney or Kruskal-Wallis was used for numerical variables and chi-square or Fisher's exact for categorical. Multiple logistic regression was used to evaluate health precautions and multinomial logistic regression was used to observe willingness for vaccination.

Results: The commitment to the majority of health precautions was predicted by perceiving COVID-19 threat, educational level, and city residency ($P < 0.05$). Social distancing and sterilizer usage were associated with city residency ($P < 0.001$). Students, males, and unemployed participants were less committed to health precautions ($P < 0.05$). Vaccination willingness was less predicted by the perception of an ineffective vaccine ($P < 0.001$), perceiving no threat of COVID-19 ($P < 0.05$) or perception of threat for old/or chronic diseases ($P < 0.05$), employed participants ($P < 0.05$), without chronic diseases ($P < 0.05$), and not committed to wearing a mask ($P < 0.001$).

Conclusion: COVID-19 threat perception, high education level, and city residency predict more commitment to health precautions, in contrast to male students and unemployed participants. On the other hand, having no chronic diseases, perception of ineffective vaccines, unperceived COVID-19 threat, and unwillingness to wear masks predicted less vaccination acceptance. Therefore, it is critical to increase awareness about the COVID-19 threat, health precautions, and vaccination efficacy.

This study is cross-sectional. Future works concerning changes in Attitudes toward COVID-19 health precautions and vaccination should be encouraged, including vaccinated participants.

Keywords: COVID-19, vaccination, acceptance, universal precautions, attitudes, awareness.

1. INTRODUCTION

Coronavirus Disease-2019 (COVID-19), which is caused by a novel coronavirus, was first reported in China in late December 2019. It was labeled as a pandemic by the World Health Organization (WHO) on 11 March 2020. This pandemic

has become a serious global health concern as it is considered the most devastating pandemic in the last century after the Spanish flu [1]. At the time of writing this manuscript, more than 177 million confirmed cases, including more than 3.8 million deaths, were recorded globally [2].

The commitment to the use of facemasks and accordingly the associated physical and mental health consequences varied significantly among different countries in the world depending on several factors [3]. Social distancing measures were associated with a high rate of household income loss as well as impairment in some quality-of-life domains among the general population [4]. The practice and appreciation of hand

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hygiene were reported to be very different from one region to another in the same country [5]. As part of published series, the lockdown was catastrophic for some communities, which made it difficult or nearly impossible for poor communities with limited resources to apply these measures [6, 7]. The return to work during the pandemic was not associated with a high level of psychiatric symptoms in other communities; these specific data and the different demands on health information can differ according to socioeconomic and other possible factors [8].

In Palestine, a country with an approximate population of 5,000,000 (<http://www.pcbs.gov.ps>), the first six COVID-19 cases were reported in the city of Bethlehem on 5 March 2020 [9]. Since then, the number of new cases has been rising rapidly in the country. As of 17 June 2021, the state of Palestine has recorded more than 341,000 positive cases of COVID-19, including more than 3800 deaths (www.corona.ps).

The most important plan in the battle against COVID-19 is to develop enough safe and effective vaccines to control the transmission rate [10]. However, manufacturing, distribution, and administering the vaccines could seriously face multiple challenges [11]. Thus, large efforts by the scientific researchers and pharmaceutical industry with governmental support are strongly warranted to ensure the success in this direction [12].

As of 18 February 2021, at least seven different vaccines have been rolled out in different parts of the world. At the same time, more than 200 additional vaccine candidates are in development, of which more than 60 are in clinical development. These vaccines included many different types: Inactivated or weakened virus vaccines, protein-based vaccines, viral vector vaccines, and RNA and DNA vaccines (www.who.int). The success in developing these vaccines in a short time is a great and historical achievement. Nevertheless, it is only the first step in a long game-changing strategy toward Severe Acute Respiratory Syndrome Corona Virus 2 (SARS-CoV-2) prevention. This is emphasized by the fact that the impact of COVID-19 vaccines on the pandemic depends on several factors. These include, but are not limited to, the effectiveness of the vaccines; how quickly they are approved, manufactured, and delivered; the possible development of other variants, and how many people get vaccinated (www.who.int). Ensuring fair and equitable allocation for all regions in the world and increasing public awareness are important measures to be taken.

Vaccine hesitancy is the term used to describe: “delay in acceptance or refusal of vaccination despite the availability of vaccination services” [13]. Addressing the scope of COVID-19 vaccine hesitancy in various countries is recommended as an initial step for building trust in COVID-19 vaccination efforts [14, 15]. The most common reasons for vaccine hesitancy are perceived risk *versus* benefits, certain religious beliefs, lack of knowledge and awareness, and rumors or fake news [16-19]. People were more likely to perceive the pandemic as severe, considered the vaccines safe, had fewer financial concerns, less stigmatization toward the vaccine, increased pro-socialness mindset, and trust in health authorities [20].

It is therefore essential for policy decision-makers to gain insights to examine community commitment to COVID-19 health precautions and its willingness to receive COVID-19 vaccinations for implementing the most effective strategy in Palestine. To the best of our knowledge, there has been no prior study among the general population in Palestine addressing these important issues.

2. METHODS

2.1. Design and Participants

This was a cross-sectional study carried out in Palestine with an approximate population of 5,000,000 and an adult population (18 years old and above) of approximately 3,000,000 (<http://www.pcbs.gov.ps>). To reach the participants, convenience sampling and snowball sampling methods were used. The sample size was calculated based on a single proportion formula, considering a sample proportion of 50% while using a cross-sectional study design wherein $n = Z^2 \frac{pq}{d^2}$ and 95% CI with 5% margin of error. Therefore, we required a sample size of 385 as the study's target population to represent the general population. Subsequently, complete data were collected from 1380 individuals between February and June 2021. However, the calculations were made with 1367 individuals, as we dropped 13 participants who indicated to be illiterate, the reason for that was due to the subjectivity of the collected data.

Participants were recruited by electronic post of an online questionnaire, including a web link to the questionnaire page in a Google Form *via* email or public social media pages and applications (*e.g.*, Facebook, WhatsApp, *etc.*). The participants could answer the electronic questions, then click and submit, which re-upload the answers in the same electronic form back to the researchers. People excluded from the study were those who refused to participate, without social media access or telephone, participants under 18 years old, and vaccinated participants. The study was approved by the Institutional Review Board (IRB) of An-Najah University in Nablus, West Bank of Palestine (Ref: Med. Nov. 2020/2), and was performed in compliance with the Helsinki Declaration for research in humans. All participants provided their informed consent to participate in this research before they were included in the study.

2.2. Data Collection and Assessment Tool

A collection data notebook was specially prepared to record the participants' information. The questionnaire used in this study consisted of closed-ended questions, divided into demographic and clinical information of the participants, their commitment to five COVID-19 health precautions, perception of COVID-19 vaccination, and willingness to receive COVID-19 vaccination. Responses, other than demographic and clinical characteristics were based on dichotomous questions that asked for yes/no responses. However, responses concerning the willingness to receive COVID-19 vaccination were based on a question with 3 response options: Maybe, No and yes response. The questionnaire was administered in Arabic since this is the language of the people in the West Bank of Palestine. Before the questionnaire was sent to the partici-

pants, experts in public health, medicine, and pharmacy education in the West Bank reviewed it. The survey questions were tested in a pilot study involving 50 participants. Subsequently, a series of revisions to ensure high internal consistency of Cronbach's alpha was performed. The Cronbach's Alpha of the questions was 0.755.

2.3. Data Analysis

The Statistical Package for the Social Sciences (SPSS v.25) was used to carry out statistical analysis. An initial descriptive analysis was performed, with data expressed as frequency and percentage for categorical variables. A P-Value <0.05 was considered statistically significant.

To carry out comparisons, Mann-Whitney or Kruskal-Wallis was used for numerical variables. The correspondent contingency table analysis was carried out using the chi-square test or Fisher's exact test was used for the commitment to COVID-19 health precautions (coded as 1 = No and 2 = Yes) and willingness for receiving COVID-19 vaccine (coded as 1 = Maybe, 2 = No, and 3 = Yes).

Multiple logistic regression was carried out using variables that showed statistical significance in the comparison tests and other variables of clinical significance to determine predictors of commitment to COVID-19 health precautions. Furthermore, multinomial logistic regression analysis was used to assess the predictors for willingness to receive the COVID-19 vaccine.

3. RESULTS

3.1. Socio-Demographic and Clinical Characteristics of the Participants

A total of 1367 participants were recruited. The participants had a mean age \pm SD of 26.5 ± 12.4 years old (range: 18-90 years old). More than half of the participants were female (66.1%). Most of them (79.9%) had university study levels, less than half were living in cities (48.1%) and villages (48.5%), and more than half of them were university students (59.6%). The household monthly income range of 2000-4999 ILS acquired the largest percentage of participants (47.5%). Concerning the clinical characteristics of the participants, the distribution of the participants according to their Body Mass Index (BMI) was: underweight (7.8%), normal weight (56.5%), overweight (25.7%), and obese (10%).

On the other hand, about 6.7% of the participants had chronic pain, and 7.2% had a chronic disease. Furthermore, 9.8% were infected, and 75.5% had a known/relative person infected with COVID-19. The participants were also asked about their opinions regarding the threat of the COVID-19, and their answers were distributed as: 3.9 % perceived no threat to health, 62% perceived that it is dangerous for old people and/or people with chronic diseases, and 34.1% perceived that it is very dangerous to life. The participants were also asked about their perception regarding the effectiveness of the newly discovered COVID-19 vaccine. 85.3% believed in the effectiveness, whereas 14.7% believed that it to be ineffective.

3.2. COVID-19 Health Precautions Commitments According to Socio-Demographic and Clinical Characteristics

Table 1 represents the distribution of participants' commitments to COVID-19 health precautions according to their socio-demographic and clinical characteristics. Subsequently, females showed more commitment to social distancing, not touching the face, and using sterilizers ($P < 0.05$). Regarding the commitment to mask-wearing, participants living in cities and those who were university students were observed to be more committed ($P < 0.05$), on the other hand, the educational level also showed to be significantly associated ($P < 0.05$).

Furthermore, participants living in cities, employed participants, and those with high educational levels (*i.e.*, postgraduate studies) showed more tendencies toward social distancing ($P < 0.05$). Concerning the commitment to not touching the face, participants living in cities, employed, and those with high educational levels were more committed ($P < 0.05$). In addition, there were clear associations between sterilizer usage among almost all demographic characteristics ($P < 0.05$). However, there were no significant associations between the income level and all COVID-19 health precautions.

Furthermore, there were no significant associations between almost all clinical characteristics and COVID-19 health precautions. However, there was a significant association between BMI and wearing masks ($P < 0.05$). Consequently, underweight participants were more likely to use masks than normal weight, overweight, or obese participants ($P < 0.05$). The participants without known/relative persons infected with COVID-19 significantly showed more commitment to not touching the face as one of the COVID-19 health precautions ($P < 0.05$).

In addition, the participants who perceived the very dangerous threat of COVID-19 infection on people's lives significantly showed to be more committed to all COVID-19 health precautions ($P < 0.001$). In addition, participants who perceived an effective COVID-19 vaccine showed to be more committed to frequent hand washing ($P < 0.05$).

3.3. Willingness to Receive COVID-19 Vaccine According to Socio-Demographic and Clinical Characteristics, and COVID-19 Health Precautions Commitments

The associations of the participants' socio-demographic and clinical characteristics with their willingness to receiving COVID-19 vaccine are summarized in Table 2. Accordingly, there was a significant association between the participants' willingness for receiving COVID-19 vaccination and their employment status. The unemployed participants were significantly most likely to accept receiving the COVID-19 vaccine ($P < 0.05$). In addition, knowing a person infected with COVID-19, perceptions concerning COVID-19 threat and COVID-19 vaccine were included in the significant association with their willingness to receive COVID-19 vaccine ($P < 0.05$).

Consequently, participants who indicated that none of the relatives/known persons got infected, perceived a very dangerous threat of COVID-19 infection to life, and those who perceived an effective COVID-19 vaccine were more willing

to receive COVID-19 vaccine ($P < 0.05$, $P < 0.001$, $P < 0.001$ respectively). The results concerning associations between commitment to COVID-19 health precautions and participants' willingness of receiving the COVID-19 vaccine are also

summarized in Table 2. Subsequently, participants who reported commitment to wearing masks, frequent hand washing, and using sterilizers were significantly more willing to receive the COVID-19 vaccine ($P < 0.001$, $P < 0.05$, $P < 0.05$, respectively).

Table 1. COVID-19 health precautions commitments according to socio-demographic & clinical characteristics.

	Wearing Masks		Frequent Hand Washing		Social Distancing		Not Touching the Face		Using Sterilizers	
	Yes	P	Yes	P	Yes	P	Yes	P	Yes	P
Total, Yes, %	83	-	82.3	-	64.6	-	43.1	-	69.6	-
Age (years)*	21 (19-28)	<0.001	21 (19-30)	<0.001	21 (19-32)	<0.001	22 (19-32)	<0.001	21 (19-30)	0.026
Gender, F, % /M, %	84/81	0.167	83.7/79.9	0.079	66.8/60.3	0.016	45.1/39.1	0.033	71.7/65.4	0.018
Living Site, %	-	0.035	-	0.572	-	<0.001	-	0.029	-	<0.001
Palestinian Refugee Camp	74.5	-	70.9	-	46.8	-	36.2	-	46.8	-
City	85.4	-	81.4	-	72.1	-	46.7	-	77.5	-
Village	81.1	-	83.6	-	58.4	-	40.0	-	63.3	-
Educational Level, %	-	0.012	-	0.286	-	<0.001	-	0.001	-	0.010
School Study	72.3	-	79.2	-	53.5	-	32.7	-	58.4	-
University Study	83.8	-	82.1	-	63.4	-	42.3	-	69.6	-
Post Graduate Study	83.9	-	86.2	-	78.7	-	54.0	-	75.9	-
Employment Status	-	0.001	-	0.144	-	<0.001	-	0.001	-	0.007
Employed	79.8	-	84.2	-	73.2	-	49.9	-	74.4	-
Unemployed	74.8	-	86.6	-	58.3	-	46.5	-	60.6	-
Student	85.9	-	80.9	-	61.1	-	39.0	-	68.5	-
Income Level, %	-	0.383	-	0.308	-	0.435	-	0.379	-	0.215
Less than 2000	84.2	-	86.3	-	61.6	-	47.9	-	65.1	-
2000-4999	81.2	-	83.4	-	63.2	-	42.2	-	68.6	-
5000-9999	83.9	-	80.8	-	66.3	-	41.1	-	70.3	-
10000 & more	85.9	-	79.7	-	68.2	-	46.6	-	75.0	-
Chronic Pain, Yes/ No, %	82.6/83	0.927	87/82.1	0.239	63/64.7	0.747	38/43.5	0.312	75/69.2	0.241
Chronic Disease, Yes/ No, %	79.6/83.2	0.358	85.7/82.2	0.377	60.2/64.9	0.346	39.8/43.3	0.495	66.3/69.8	0.469
BMI (%)	-	0.036	-	0.459	-	0.304	-	0.199	-	0.472
Under Weight	89.6	-	84.0	-	72.6	-	38.7	-	73.6	-
Normal Weight	84.2	-	82.3	-	63.3	-	42.8	-	68.0	-
Over Weight	80.1	-	84.0	-	65.0	-	41.9	-	70.4	-
Obese	78.1	-	78.1	-	65.0	-	51.1	-	73.0	-
COVID-19 Infected? Yes/ No, %	79.1/83.4	0.212	79.1/82.8	0.285	61.2/65	0.386	41.8/43.2	0.750	73.1/69.2	0.345
Knowing Person Infected with COVID-19? Yes/ No, %	83.3/81.8	0.514	82.3/83	0.764	64/66.6	0.385	41.2/49	0.013	69.8/69	0.779

(Table 1) contd....

-	Wearing Masks		Frequent Hand Washing		Social Distancing		Not Touching the Face		Using Sterilizers	
-	Yes	P	Yes	P	Yes	P	Yes	P	Yes	P
Perception of COVID-19 Threat, %	-	<0.001	-	<0.001	-	<0.001	-	<0.001	-	<0.001
It does not pose threat to health	58.5	-	62.3	-	50.9	-	41.5	-	50.9	-
Dangerous for old people/ or people with chronic diseases	79.5	-	81.3	-	58.7	-	37.4	-	64.4	-
It is very dangerous to life	92.1	-	86.9	-	76.8	-	53.6	-	81.1	-
Opinion about COVID-19 Vaccine Effective/Ineffective, %	83.5/79.6	0.171	83.5/76.1	0.011	65.2/61.2	0.275	43.4/41.3	0.578	70.6/63.7	0.050

Abbreviations: F: Female. M: Male. BMI: Body Mass Index. *: median. P: p-values. Bold p-values are statistically significant.

Table 2. Willingness to receive COVID-19 vaccine according to socio-demographic & clinical characteristics, & COVID-19 health precautions commitments.

-	Willingness to Receive COVID-19 Vaccine			
-	Maybe	No	Yes	P
Total, N, (%)	631 (46.2)	298 (21.8)	438 (32)	-
Age (years)*	21 (19-28)	22 (19-34)	21 (19-28.3)	0.015
Gender, F,% /M, %	45.7/45.3	20.5/22.5	33.7/31.2	0.564
Living Site, %	-	-	-	0.245
Palestinian Refugee Camp	42.5	14.9	42.5	
City	48.1	22.2	29.7	-
Village	295	144	33.6	-
Educational Level	-	-	-	0.149
School Study	40	27	33.7	-
University Study	511	224	32.7	-
Post Graduate Study	80	47	27	-
Employment Status	-	-	-	0.004
Employed	189	109	29.9	-
Unemployed	45	37	35.4	-
Student	397	152	32.6	-
Income Level	-	-	-	0.121
Less than 2000	61	45	27.4	-
2000-4999	312	131	31.7	-
5000-9999	168	86	33.2	-
10000 & more	90	36	34.4	-
Chronic Pain, Yes/ No,%	51.1	22.8/21.7	26.1/32.5	0.437
Chronic Disease, Yes/ No,%	40.8/46.6	16.3/22.2	42.9/31.2	0.051

(Table 2) contd....

-	Willingness to Receive COVID-19 Vaccine			
	Maybe	No	Yes	P
BMI	-	-	-	0.937
Under Weight	44.3	25.5	30.2	-
Normal Weight	46.6	21.3	32.1	-
Over Weight	47	20.8	32.2	-
Obese	43.1	24.1	32.8	-
COVID-19 Infected? Yes/ No,%	-	-	-	0.152
Knowing Person Infected with COVID-19? Yes/ No,%	47.9/39.7	20.4/25.2	31.7/33.1	0.041
Perception of COVID-19 Threat	-	-	-	<0.001
Does not pose threat to health	49.1	39.6	11.3	-
Dangerous for old people/ or chronic diseases people	47.5	23.8	28.7	-
Very dangerous to life	43.3	16.1	40.6	-
Opinion about COVID-19 Vaccine, Effective/Ineffective, %	47.7/37.3	16.5/52.7	35.8/10	<0.001
Wearing Masks, Yes/ No,%	46.6/44.2	19/35.6	34.5/20.2	<0.001
Frequent Hand Washing, Yes/ No,%	46.3/45.4	20.2/29.2	33.5/25.4	0.004
Social Distancing, Yes/ No,%	45/48.3	22.5/20.5	32.5/31.2	0.457
Not Touching Face, Yes/ No,%	42.8/48.7	22.9/21	34.3/30.3	0.091
Using Sterilizers, Yes/ No,%	46.5/45.4	20/26	33.5/28.6	0.030

Abbreviations: F: Female. M: Male. BMI: Body Mass Index. *: median. P: p-values. Bold p-values are statistically significant.

3.4. Multiple Logistic Regression Analysis of COVID-19 Health Precautions Commitments

The multivariate analysis showed that the postgraduate study was significantly related to increased odds of commitment to wearing masks ($P < 0.05$). Overweight participants were less likely to report commitment to wearing a mask compared to underweight participants (OR=0.490; 95%CI of 0.241-0.996). Furthermore, beliefs regarding COVID-19 being a dangerous threat to old people or those with chronic diseases, and very dangerous to life were significantly related to increased odds of reporting commitment to wearing masks ($P < 0.05$, $P < 0.001$, respectively). In addition, age was significantly related to decreased odds of commitment to wearing masks ($P < 0.05$) (Table 3).

Table 3 shows that age is significantly related to increased odds of commitment to frequent hand washing ($P < 0.05$). The participants perceived a dangerous threat of COVID-19 for old people or those with chronic diseases, and for life therefore, they were more likely to be committed to frequent hand-washing compared to those who perceived no threat of COVID-19 (OR=2.541; 95%CI of 1.417-4.558, OR=3.837; 95%CI of 2.063-7.136, respectively). Furthermore, participants who perceived COVID-19 vaccine to be effective were more likely to be committed to frequent hand-washing compared to those who perceived an ineffective vaccine (OR=1.504; 95%CI of 1.045-2.163).

According to what is summarized in Table 3, male participants were less likely to be committed to social distancing

compared to female participants (OR=0.603; 95%CI of 0.464-0.784). In addition, participants living in cities were more likely to be committed to social distancing compared to those living in refugee camps (OR=2.415; 95% CI of 1.279-4.560). In addition, having a postgraduate study level was significantly related to increased odds of commitment to social distancing ($P < 0.05$). Furthermore, participants who were unemployed or students were less likely to be committed to social distancing compared to employed participants (OR=0.550; 95% CI of 0.346-0.873, OR=0.529; 95% CI of 0.389-0.718). In addition, the perception of the dangerous threats of COVID-19 to life were significantly related to increased odds of commitment to social distancing ($P < 0.001$).

The results of the multivariate analysis of practices such as avoiding touching the face (Table 4) showed that male participants were less likely to be committed to avoiding touching the face compared to female participants (OR=0.690; 95% CI of 0.536-0.889). Concerning the participants with university and postgraduate study levels, they were more likely to be committed to avoiding touching the face compared with participants with school study levels (OR=1.632; 95% CI of 1.027-2.596, OR=1.964; 95% CI of 1.137-3.393, respectively). In addition, knowing people infected with COVID-19 was significantly related to decreased odds of commitment to avoid touching face ($P < 0.05$). In addition, the university students were less likely to be committed to avoiding touching the face compared to employed participants (OR=0.602; 95% CI of 0.454-0.798).

According to what is summarized in Table 4, age was significantly related to decreased odds of commitment to using sterilizers ($P < 0.05$). Male participants were less likely to be committed to using sterilizers compared to female participants ($OR=0.641$; 95% CI of 0.490-0.839). However, living in cities and perceiving the very dangerous threats of COVID-19 to life were significantly related to increased odds of commitment to using sterilizers ($P < 0.001$). The unemployed participants and those who indicated they are university students were less likely to report commitment to use sterilizers compared with employed participants ($OR=0.577$; 95% CI of 0.360-0.925, $OR=0.637$; 95% CI of 0.464-0.875, respectively) (Table 4).

3.5. Multinomial Regression Analysis of Willingness to Receive COVID-19 Vaccine

Table 5 shows the results of the multinomial regression analysis regarding the willingness to take the vaccine; the reference class for this analysis was not ready to take the vaccine. Employed and unemployed participants with reference to students were less likely to be unsure about taking the vaccine (P

< 0.05) while being employed can predict less willingness to take it ($P < 0.05$). Those who did not perceive the effectiveness of the vaccine were less likely to be unsure or ready to take the vaccine ($P < 0.001$).

Participants who believe that COVID-19 does not pose a threat to health, those who see it dangerous for old people with or without chronic diseases, and people who see that it is very dangerous to life, were less likely to be ready to take the vaccine ($P < 0.05$). The participants who do not have known or a relative person infected were less likely to be unsure to take the vaccine ($P < 0.05$), while a participant without chronic diseases was less likely to be ready to take it ($P < 0.05$). Regarding the variables that represent the commitment to health precautions, the analysis showed that the participants who are not committed to wearing masks were less likely to be unsure or ready to take the vaccine ($P < 0.001$), while those who are not committed to not touching the face were more likely being unsure in taking the vaccine ($P < 0.05$).

Table 3. Health precautions (wearing masks, frequent hand washing and social distancing) and influencing factors (multiple logistic regression analysis).

Health Precautions	Variable (Reference)	P	Odds Ratio with 95% CI
Wearing Masks	Age	0.038	0.984 (0.969-0.999)
	Living Site (Palestinian Refugee Camp)	-	-
	City	0.705	1.158 (0.542-2.474)
	Village	0.779	0.898 (0.424-1.902)
	Educational Level (School Study)	-	-
	University Study	0.070	1.612 (0.963-2.700)
	Post Graduate Study	0.045	1.940 (1.014-3.713)
	Employment (Employed)	-	-
	Unemployed	0.571	0.864 (0.520-1.434)
	Students	0.059	1.419 (0.987-2.040)
	BMI (Underweight)	-	-
	Normal	0.141	0.605 (0.310-1.182)
	Overweight	0.049	0.490 (0.241-0.996)
	Obese	0.060	0.473 (0.217-1.033)
	Perception of COVID-19 Threat (Does not pose threat to health.)	-	-
	Dangerous for old people/ or chronic diseases people.	0.004	2.361 (1.308-4.261)
	Very dangerous to life.	<0.001	7.285 (3.769-14.084)
Frequent Hand Washing	Age	0.002	1.023 (1.008-1.038)
	Perception of COVID-19 Threat (Does not pose threat to health.)	-	-
	Dangerous for old people/ or chronic diseases people.	0.002	2.541 (1.417-4.558)
	Very dangerous to life.	<0.001	3.837 (2.063-7.136)
	Opinion about COVID-19 Vaccine (Ineffective)	-	-
	Effective	0.028	1.504 (1.045-2.163)

(Table 3) contd....

Health Precautions	Variable (Reference)	P	Odds Ratio with 95% CI
Social Distancing	Age	0.517	0.996 (0.982-1.009)
	Gender (Female)	-	-
	Male	<0.001	0.603 (0.464-0.784)
	Living Site (Palestinian Refugee Camp)	-	-
	City	0.007	2.415 (1.279-4.560)
	Village	0.311	1.384 (0.738-2.597)
	Educational Level (School Study)	-	-
	University Study	0.124	1.426 (0.907-2.241)
	Post Graduate Study	0.013	2.081 (1.169-3.705)
	Employment (Employed)	-	-
	Unemployed	0.011	0.550 (0.346-0.873)
	Students	<0.001	0.529 (0.389-0.718)
	Perception of COVID-19 Threat (Does not pose threat to health.)	-	-
	Dangerous for old people/ or chronic diseases people.	0.325	1.341 (0.748-2.405)
	Very dangerous to life.	<0.001	3.073 (1.673-5.644)

Abbreviations: BMI: Body Mass Index. P: p-values. Bold p-values are statistically significant.

Table 4. Health precautions (not touching face and sterilizer usage) and influencing factors (multiple logistic regression analysis).

Health Precautions	Variable (Reference)	P	Odds Ratio with 95% CI
Not Touching Face	Age	0.152	0.991 (0.978-1.004)
	Gender (Female)	-	-
	Male	0.004	0.690 (0.536-0.889)
	Living Site (Palestinian Refugee Camp)	-	-
	City	0.272	1.439 (0.752-2.754)
	Village	0.751	1.111 (0.582-2.120)
	Educational Level (School Study)	-	-
	University Study	0.038	1.632 (1.027-2.596)
	Post Graduate Study	0.015	1.964 (1.137-3.393)
	Employment (Employed)	-	-
	Unemployed	0.733	0.926 (0.598-1.436)
	Students	<0.001	0.602 (0.454-0.798)
	Knowing Person Infected with COVID-19? (No)	-	-
	Yes	0.009	0.707 (0.546-0.916)
	Perception of COVID-19 Threat (Does not pose threat to health.)	-	-
	Dangerous for old people/ or chronic diseases people.	0.599	0.855 (0.478-1.531)
	Very dangerous to life.	0.089	1.675 (0.924-3.036)

Table 4) contd....

Health Precautions	Variable (Reference)	P	Odds Ratio with 95% CI
Sterilizer Usage	Age	0.040	0.986 (0.972-0.999)
	Gender (Female)	-	-
	Male	0.001	0.641 (0.490-0.839)
	Living Site (Palestinian Refugee Camp)	-	-
	City	<0.001	3.304 (1.738-6.282)
	Village	0.096	1.710 (0.908-3.218)
	Educational Level (School Study)	-	-
	University Study	0.158	1.399 (0.878-2.229)
	Post Graduate Study	0.291	1.366 (0.765-2.438)
	Employment (Employed)	-	-
	Unemployed	0.022	0.577(0.360-0.925)
	Students	0.005	0.637 (0.464-0.875)
	Perception of COVID-19 Threat (Does not pose threat to health.)	-	-
	Dangerous for old people/ or chronic diseases people.	0.125	1.581 (0.880-2.840)
	Very dangerous to life.	<0.001	3.664 (1.981-6.775)
	Opinion about COVID-19 Vaccine (Ineffective)		
	Effective	0.073	1.354 (0.972-1.885)

Note: P: p-values. Bold p-values are statistically significant.

Table 5. Willingness to receive COVID-19 vaccine and influencing factors (multinomial regression analysis).

-	Unsure about Taking Vaccine ^a		Ready to Take Vaccine ^a	
	P	Odds Ratio with 95% CI	P	Odds Ratio with 95% CI
Age	0.673	0.996 (0.980-1.013)	0.226	1.011 (0.993-1.029)
Employment (Students B=0 ^b)	-	-	-	-
Employed	0.010	0.652 (0.471-0.904)	0.008	0.610 (0.425-.877)
Unemployed	0.030	0.572 (0.345-0.949)	0.646	0.882 (0.516-1.508)
Opinion about COVID-19 Vaccine (Effective, B=0 ^b)	-	-	-	-
Ineffective	<0.001	0.242 (0.171-0.344)	<0.001	0.085 (0.050-0.143)
Perception of COVID-19 Threat (Very dangerous to life B=0 ^b)	-	-	-	-
Does not pose threat to health.	0.413	0.746 (0.371-1.502)	0.003	0.211 (0.077-0.579)
Dangerous for old people/ or chronic diseases people.	0.244	0.818 (0.584-1.147)	0.002	0.562 (0.393-0.804)
Knowing Person Infected with COVID-19? (Yes, B=0 ^b)	-	-	-	-
No	0.045	0.712 (0.510-0.993)	0.466	0.874 (0.609-1.255)
Chronic Disease? (Yes, B=0 ^b)	-	-	-	-
No	0.315	0.719 (0.379-1.367)	0.026	0.470 (0.242-.914)
Wearing Masks (Yes, B=0 ^b)	-	-	-	-
No	0.001	0.520 (0.356-0.759)	<0.001	0.358 (0.228-.563)

(Table 5) contd....

	Unsure about Taking Vaccine ^a		Ready to Take Vaccine ^a	
	P	Odds Ratio with 95% CI	P	Odds Ratio with 95% CI
Using Sterilizers(Yes, B=0 ^b)	-	-	-	-
No	0.726	0.939 (0.660-1.336)	0.994	0.999 (0.676-1.475)
Not Touching Face(Yes, B=0 ^b)	-	-	-	-
No	0.011	1.508 (1.099-2.070)	0.124	1.310 (0.928-1.849)
Frequent Hand Washing(Yes, B=0 ^b)	-	-	-	-
No	0.193	0.770 (0.519-1.142)	0.119	0.699 (0.445-1.096)

Note: ^aThe reference category is: Not ready to take vaccine. B: Regression coefficients. ^bThis parameter is set to zero because it is redundant. P: p-values. Bold p-values are statistically significant.

4. DISCUSSION

This study aimed to assess the commitment of the Palestinian population towards COVID-19 health precautions and the willingness to receive COVID-19 vaccinations. In this study, the results showed important differences in commitment to health precautions between males and females, which could be supported by the hypothesis that females are more likely to adopt preventive measures than males [21-23].

Notably, this study shows that age predicts less commitment to wearing masks and using sterilizers despite its importance, which goes in line with other published series. On the other hand, the increase in age predicted commitment to frequent hand washing [24, 25]. These findings add to the previous knowledge by showing that older people became less likely to engage in healthy behaviors in the COVID-19 pandemic situation. Older persons may have become aware that they are more vulnerable to poor outcomes from the virus and are requested to follow better hygiene, wear masks, observe social distancing, and follow other related behaviors. Nevertheless, this awareness may have not been translated properly into action after the pandemic started and increases in infections and deaths were reported daily. As for hand washing, the reason is that it is a part of daily habits. These results were justifiable and comparable with the published series [24, 26]. This differential trend in personal behaviors such as wearing a mask, and social distancing (non-significant) and avoiding visiting with friends and family points out how people's responses to the pandemic are quite mixed.

Furthermore, students and unemployed people were less likely to be committed to COVID-19 health precautions. This is in line with other studies [4]. Residents in cities were more committed to COVID-19 health precautions than those living in villages or Palestinian refugee camps. This echoes previous research [22] and could be attributed to the existing differences in health access and outcomes for cities compared to villages and campaigns. This necessitates considering adopting programs aimed at improving COVID-19 preventive behavior adoption in rural areas. On the other hand, it is noteworthy that our results are in contrast with a recent study in Palestine in which the place of residence did not make a difference in the attitudes towards COVID [27]. However, this latter study was conducted with Palestinian university students only, as the study suggested that the university might unify the knowledge and attitudes of its students. The current

study included a larger sample and was generalized to the whole Palestinian population.

The current results showed logic and justified commitment to health precautions by those with higher education and those who perceived the dangerous threats of COVID-19. This is in line with the hypothesis that with the greater the sense of danger in the individual institution or society, there exist more caution and preventive precautions. These findings are in harmony with the published series stating that adherence to preventive measures is the best solution to confront this pandemic [28].

Surprisingly, this study showed that overweight participants were less likely to be committed to wearing masks. A result that is found to be unjustifiable, as the published works, in general, found that overweight and obese were significantly associated with increased risk for ICU admission due to COVID-19 pandemic [29] and that the less weight individuals have a healthier lifestyle, therefore, are expected to be in better health and without any chronic diseases. On the other hand, one must not ignore other intervening complex factors [29].

COVID-19 vaccination is the main issue that occupies the minds of Palestinians, in particular, and the whole world, in general. Our study showed a non-confirmed willingness towards receiving COVID-19 vaccination, as the majority of the participants were unsure about taking it. Accordingly and consistent with the results, participants who did not perceive the effectiveness of vaccines, believing that COVID-19 had minor or no threat, those who did not have a relative people infected with COVID-19, without chronic diseases, and were not committed to wearing a mask were less willing to receive the vaccine. Consequently, this is in line with other studies [30] and is consistent with the health behavior change theory which predicts that people who feel susceptible to the health threat are most likely to be willing to get vaccinated [31].

Published researches in Japan reported a gap concerning gender, older age, and educational level toward the willingness to receive the vaccine, which in occasions showed that females aged 30-40 years old and higher education participants did not accept to receive the vaccine [32], while in other works in the united kingdom, despite uncertainty about the details of COVID-19 vaccination, most participants reported intending to be vaccinated for COVID-19 [33]. This uncertainty and non-equal opinions of populations may be related

to the cultural differences, period of data collection, used strategies, education regarding vaccines, and many other possible reasons.

Our findings may imply the need for intervention for this population regarding COVID-19 vaccination. Providing education about COVID-19 and influenza vaccination at the workplace may be an effective strategy to increase COVID-19 vaccine uptake.

The inclusion of vaccinated population was planned, but during the period of data collection, the number of vaccinated subjects was limited to a small portion of the Palestinian population, besides that, this study is cross-sectional which made it very difficult for this portion to be included in our sample. Published series studied the evidence and considerations of COVID-19 vaccination [34, 35] but concepts like vaccine distribution, variants of concern, herd immunity, vaccine efficacy, vaccine safety, and vaccine dose are needed to be discussed. Future cohort works concerning changes in attitudes toward COVID-19 health precautions and vaccination should be encouraged including the vaccinated participants, perhaps, this population could clarify how or why they were motivated to take the vaccine. Also, we encourage future researches to deal with the different mutations and/or different vaccines and other works that cover and describe the provided health care.

CONCLUSION

This study assessed the commitment towards COVID-19 health precautions and the willingness for receiving vaccinations. The perception of COVID-19 threat, high educational level, and residency in cities are predictors for commitment to health precautions. Male students and unemployed participants were less committed to health precautions. The perception of an ineffective vaccine, unperceived COVID-19 threat, having no chronic diseases, and being not committed to wearing a mask predicts less willingness to take the vaccine. It is critical to increase people's awareness about the threat of COVID-19 and the efficacy of health precautions and vaccinations.

LIST OF ABBREVIATIONS

COVID-19	=	Coronavirus Disease-2019
SARS-CoV-2	=	Severe Acute Respiratory Syndrome Corona Virus 2
WHO	=	World Health Organization

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

The study was approved by the Institutional Review Board (IRB) of An-Najah University in Nablus (West Bank, Palestine) (Approval: Ref: Med. Nov. 2020/2).

HUMAN AND ANIMAL RIGHTS

No animals were used in this study. The study was performed in compliance with the Helsinki Declaration for research in humans.

CONSENT FOR PUBLICATION

All participants provided their informed consent to participate in this research before they were included in the study.

STANDARD OF REPORTING

STROBE guidelines were used in this study.

AVAILABILITY OF DATA AND MATERIALS

Not applicable.

FUNDING

None.

CONFLICT OF INTEREST

The authors confirm that this article content has no conflict of interest.

ACKNOWLEDGEMENTS

We thank all participants who gave their time to make this project a reality. Also, we express our thanks and gratitude to the faculty of medicine and health sciences, An-Najah National University for their kind cooperation.

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