

Compliance of the Jordanian Population with the Protective Measures during and after the COVID-19 Pandemic; A Nation-Wide Survey

Abrar Ghaith¹, Zinah Aqeel Bairmani², Muhammad Yasser Masoud³, Khadeejah M. A. Alfroukh⁴,
Hossam Tharwat Ali^{5*}

¹University of Debrecen, Faculty of Economics and Business, Debrecen, Hungary.

²Department of Pharmacology & Experimental Therapeutics, Thomas Jefferson University, Pennsylvania, USA.

³Faculty of Science, Al-Azhar University, Egypt.

⁴Al-Ahli hospital, Hebron, Palestine

⁵Qena Faculty of Medicine, South Valley University, Qena, Egypt.

ABSTRACT

Background: The COVID-19 pandemic has spread globally, with over 695 million confirmed cases and 6.9 million deaths as of September 2023. Compliance with protective measures is considered essential to combat the pandemic.

Objectives: To assess the adherence of the Jordanian population to preventive measures during the COVID-19 pandemic. The survey specifically focused on the habits and practices of Jordanians during the pandemic, as mentioned in the introductory sentence of the Google Forms questionnaire.

Methods: This cross-sectional study was conducted among the general population in Jordan aged 18 and above using an online questionnaire distributed from March to July 2022. The questionnaire was divided into two sections: demographic characteristics and practice-related questions. Data were collected using Google Forms and analyzed using R Statistical Software.

Results: Most of the 409 participants were under 30 years old (65.5%), female (70%), and held a college diploma or higher degree (80%). Around 57% had been infected with COVID-19 at least once, while 60% had a relative, friend, or colleague who died due to COVID-19. More than half of the participants (54%) demonstrated favorable practices. The multivariate analysis revealed that a previous COVID-19 infection significantly increased the odds of having favorable practices (OR=2.44; CI[1.59-3.77]; $p<0.001$).

Conclusion: This study evaluated how Jordanians adhered to COVID-19 preventive measures during the pandemic. It was found that roughly half of the population effectively followed precautions such as using masks and hand sanitizers, although adherence to a balanced diet was less frequent. The likelihood of taking precautions increased after having had COVID-19. The study also reported high vaccine acceptance rates. These findings underscore the importance of public adherence to preventive measures, especially in areas like nutrition, and provide insights for future pandemic responses.

Keywords: COVID-19, preventive measures, Jordanian population, Pandemic, protective practices.

*Corresponding author: Hossam Tharwat Ali

hossamtharwatali@gmail.com

Received: 11/05/2023 Accepted: 09/03/2024.b

DOI: <https://doi.org/10.35516/jjps.v17i3.1202>

BACKGROUND

The Coronavirus, initially identified in December 2019 in China, swiftly disseminated worldwide, leading to the World Health Organization (WHO) declaring COVID-19 a global pandemic on March 11, 2020 (1). As of April 12, 2023, WHO records indicate more than 762 million confirmed COVID-19 cases and approximately 6.9 million associated fatalities (1).

Transmission of COVID-19 can occur through intermediary hosts, such as bats, or via direct human-to-human contact through respiratory droplets or physical interaction (2). Key modes of exposure to infected droplets include touching contaminated surfaces and subsequent contact with the face, including the eyes, nose, and mouth (3). Fever, cough, and shortness of breath are the predominant symptoms of COVID-19, typically manifesting 2 to 14 days after exposure (1). In advanced stages of infection, severe acute respiratory distress can ensue, with secondary outcomes potentially encompassing death during the ICU period due to organ dysfunction, hemorrhage, and septic shock (4).

The global ramifications of the pandemic have been profound, affecting public health, economies, and societies, prompting governments and healthcare systems worldwide to grapple with containment efforts and disease-related challenges. Governments have issued specific guidelines and restrictions to mitigate virus transmission (1,4). For example, on March 20, 2020, Jordan's Prime Minister imposed a mandatory curfew from 6 p.m. to 10 a.m., with violations resulting in fines ranging from 100-500 JD or potential arrests. Jordan also implemented stringent measures, including suspending inbound and outbound flights, introducing passenger screening and quarantine protocols, and launching distance learning and medication services on April 13. As of June 6, 2020, Jordan had reported a total of 784 COVID-19 cases, comprising 125 active cases, 9 fatalities, and 571 recoveries (5).

Variations in mortality rates among countries may be attributed to the implementation of various health

measures. These health measures included social distancing, mask mandates, work reorganization, closure of commercial establishments, flight cancellations, traffic restrictions, avoidance of physical contact (e.g., handshakes and kissing), minimizing contact with shared surfaces, refraining from direct contact with confirmed cases, avoidance of touching the mouth or eyes, rigorous hand hygiene, abstaining from shared utensils, and seeking COVID-19 testing when symptomatic (6). Consequently, the adherence of the general populace to these protective measures and practices has been pivotal in controlling disease transmission and enhancing individual and community-level outcomes. Thus, this study endeavors to evaluate the compliance of the Jordanian population with protective practices during the COVID-19 pandemic, along with an exploration of factors associated with favorable adherence to these practices.

METHODS

• Study design and population

This was a cross-sectional survey using a self-administered online questionnaire targeting the general Jordanian population over the age of 18. The questionnaire was distributed, and data were collected from March to July 2022. A convenience sample of Jordanian individuals was invited to participate by sending a survey link through social media platforms (Facebook and WhatsApp). The inclusion criteria were adult individuals (≥ 18 years) residing in Jordan. A convenience sampling technique was employed, with a 95% significance level and a 5% margin of error, to determine the minimal required sample size, which was calculated to be 385 participants for a population ranging from 500,000 to infinity (7). The researchers successfully collected 409 completed questionnaires valid for analysis.

• Study tool

The constructs of this study were measured using statements from other studies that examined the knowledge, attitudes, and practices of people during

COVID-19, conducted in Nepal, Nigeria, Venezuela, Syria, multinational (Global), the Middle East, and the North Africa Region, respectively (8–13). We developed an online questionnaire after conducting a thorough literature search based on prior similar studies (8–13). The questionnaire was divided into two sections: demographic information and practice questions:

1- Demographic data included the following variables: age, gender, location, educational level, educational background, monthly income, health status, and history of COVID-19 infection and vaccination.

2- The second section, the practice questions which were in the form of frequency Likert scale from 1 (never) to 5 (always), included questions about (1) using vitamin supplements in general as vitamin D, (2) using supplements specific for the immunity as vitamin C, zinc, and magnesium nutritional supplements, as well as inquiries about (3) using hand sanitizer, medical alcohol, and other sterilizers, (4) sterilizing objects like electronic devices and surfaces, (5) wearing a mask and/or gloves, (6) whether you avoid crowds: less than six people in a confined space, (7) whether you adopted a healthier diet (i.e., did you consume more fruits, vegetables, and protein while consuming less carbohydrates and fats), (8) whether you had a PCR test for the Coronavirus, and finally (9) the question about whether you isolate yourself when you feel the symptoms of Corona or the flu or not.

● Data Collection

The questionnaire was designed using Google Forms and posted on various social media platforms. It was translated into Arabic by Deena Moghrabi, an authorized translator proficient in English, German, and Arabic. The accuracy, clarity, content validity, relevance, and conciseness of the questionnaire items were evaluated by three academics and researchers in the field of pharmacy in Jordan. Suggested amendments were discussed and incorporated before finalizing the questionnaire. Both Arabic and English sentences and answers were included for each question to accommodate Arabic and English

speakers.

● Data Analysis

The data were organized in a Microsoft Excel sheet and then imported and analyzed using R Statistical Software (v4.1.3; R Core Team 2022). For baseline demographic characteristics, frequencies and percentages were used to describe categorical variables, while means and standard deviations were used for continuous variables. In the practice section, answers were coded as follows: Never = 1, Rarely = 2, Sometimes = 3, Often = 4, Always = 5. Participants with a total score higher than or equal to the average score were considered to have favorable practices.

The Chi-square test was used to assess the significant association between demographic characteristics and the level of practice. Multivariate regression analysis was performed to assess the association between demographic characteristics and practice level. Results were reported as odds ratios (OR) and 95% confidence intervals (CI). A p-value of ≤ 0.05 was considered significant.

● Ethical considerations

This cross-sectional observational study was conducted in compliance with the Declaration of Helsinki's ethical guidelines. All participants provided informed consent before data collection, and participation was completely voluntary. Confidentiality and anonymity were ensured at every stage of the research, including data gathering, storage, and analysis. Such studies conducted by PhD students are supervised by the University of Debrecen to ensure ethical compliance.

RESULTS:

● Demographic characteristics of the participants

The total number of survey respondents who completed their data was 406 individuals, who were included in the final analyses (Table 1). Most of the participants were under the age of thirty (65.5%), and more than half were female (70%). Of the respondents, 325 individuals (80%) had a bachelor's degree or higher, while only 195 (48%) worked or studied in the health sciences

field. Most (63.8%) of the respondents had a monthly income of \$565 USD or less, while only 6.4% had an income greater than \$1,963 USD. The majority (84%) had not been diagnosed with any chronic diseases such as diabetes or high blood pressure. The vast majority (96.3%)

had received the coronavirus vaccine, while only 238 participants (58.7%) had been infected with the coronavirus. Moreover, 245 individuals (60.3%) reported having a friend or family member who died due to COVID-19.

Table 1- Baseline characteristics of the participants

Label	Frequency (%) (N= 406)
Age, years	
20-29	266 (65.5)
30-39	80 (19.7)
> 40	60 (14.8)
Gender	
Female	287 (70.7)
Male	119 (29.3)
Educational level	
College or above degree e.g. bachelor	325 (80.0)
High school	81 (20.0)
Educational background	
Health-related sciences	195 (48.0)
Non-health-related sciences	211 (52.0)
Monthly income	
565 USD or Less	259 (63.8)
565 USD – 1128 USD	91 (22.4)
1128 - 1693 USD	30 (7.4)
More than 1693 USD	26 (6.4)
Diagnosed with a chronic illness e.g. diabetes or hypertension	
No	341 (84.0)
Yes	65 (16.0)
Received COVID vaccine	
No	15 (3.7)
Yes	391 (96.3)
Infected by COVID	
No	168 (41.3)
Yes	238 (58.7)
A family member, friend, colleague or relative died due to COVID infection	
Not sure	20 (4.9)
Yes	245 (60.3)
No	141 (34.7)

• Compliance with the protective measures among the participants

Based on the results of the study, the average total score for participants' practices was 35.8 out of 45, with a standard deviation of 5.5. Only 222 participants (54.7%) had favorable practices (a score equal to or greater than the mean), while the remaining 45.3% had unfavorable practices. The highest average score for an

item was for wearing masks and/or gloves (mean = 4.4, SD = 0.8) and for using hand sanitizers, rubbing alcohol, and other antiseptics (mean = 4.4, SD = 0.7). In contrast, the lowest average score was for adopting a healthy diet (containing more fruits, vegetables, and proteins, and fewer fats and carbohydrates) (mean = 3.5, SD = 1.1). The details of the practice section results are summarized in Table 2.

Table 2- Participants' adherence to the preventive measures

Label	Mean (SD)
Consumed vitamin supplements e.g. vitamin D	3.8 (0.9)
Consumed certain supplements with potential to boost immunity (Vitamin C/Zinc/Magnesium)	3.9 (1.0)
Used hand sanitizers, rubbing alcohol and other antiseptics	4.4 (0.7)
Used disinfectants on objects e.g., groceries, electronic devices, surfaces	4.0 (1.0)
Wore face masks and/or gloves	4.4 (0.8)
Avoided crowds of More than 6 people in a closed area	3.8 (1.0)
Chose a healthier diet (more fruits, vegetables and proteins and less fats and carbohydrates)	3.5 (1.1)
Did COVID PCR Diagnostic Test	3.9 (1.2)
Self-isolated when COVID or Flu-like symptoms were experienced	4.1 (1.0)
Total score of practice	35.8 (5.5)
Practice	Frequency (%)
Favorable practice	222 (54.7)
Unfavorable practice	184 (45.3)

Chi-square tests revealed no significant differences between the groups with favorable and unfavorable practices in terms of age, gender, educational background, history of chronic diseases, or COVID-19 vaccination. However, there was a significant difference regarding history of COVID-19 infection (p-value < 0.001) and monthly income (p-value = 0.039). A higher proportion of participants with a history of COVID-19 infection were in

the favorable practices group (68.5%) compared to the unfavorable practices group (46.7%). Additionally, more participants with a higher monthly income were in the favorable practices group (Table 3). Regression analysis found that infection with COVID-19 significantly increases the odds of compliance with protective measures or having favorable practices (adjusted OR = 2.44; 95% CI: [1.59-3.77], p-value < 0.001) (Table 4).

Table 3- Distribution of participants according to practice

Label	Favorable practice	Unfavorable practice	p-value
Age, years			0.201
• 20-29	139 (62.6)	127 (69.0)	
• 30-39	44 (19.8)	36 (19.6)	
• > 40	39 (17.6)	21 (11.4)	
Gender			0.332
• Female	152 (68.5)	135 (73.4)	
• Male	70 (31.5)	49 (26.6)	
Educational level			0.844
• College or above degree e.g. bachelor	179 (80.6)	146 (79.3)	
• High school	43 (19.4)	38 (20.7)	
Educational background			0.566
• Health-related sciences	110 (49.5)	85 (46.2)	
• Non-health-related sciences	112 (50.5)	99 (53.8)	
Monthly income			0.039
• 565 USD or Less	131 (59.0)	128 (69.6)	
• 565 USD – 1128 USD	58 (26.1)	33 (17.9)	
• 1128 - 1693 USD	21 (9.5)	9 (4.9)	
• More than 1693 USD	12 (5.4)	14 (7.6)	
Diagnosed with a chronic illness e.g. diabetes or hypertension			0.178
• No	181 (81.5)	160 (87.0)	
• Yes	41 (18.5)	24 (13.0)	
Received COVID vaccine			0.929
• No	8 (3.6)	7 (3.8)	
• Yes	214 (96.4)	177 (96.2)	
Infected by COVID			<0.001
• No	70 (31.5)	98 (53.3)	
• Yes	152 (68.5)	86 (46.7)	
A family member, friend, colleague or relative died due to COVID infection			0.17
• Not sure	9 (4.1)	11 (6.0)	
• Yes	143 (64.4)	102 (55.4)	
• No	70 (31.5)	71 (38.6)	

Table 4- Regression analysis of factors affecting participants' practice

Label	Unfavorable practice	Favorable practice	OR (univariable)	OR (multivariable)
Age, years				
• 20-29	127 (47.7)	139 (52.3)	0.59 (0.32-1.05, p=0.075)	0.65 (0.32-1.33, p=0.243)
• 30-39	36 (45.0)	44 (55.0)	0.66 (0.33-1.31, p=0.234)	0.71 (0.33-1.50, p=0.371)
• > 40	21 (35.0)	39 (65.0)	-	-
Gender				
• Female	135 (47.0)	152 (53.0)	-	-
• Male	49 (41.2)	70 (58.8)	1.27 (0.82-1.96, p=0.281)	1.35 (0.85-2.16, p=0.208)
Educational level				
• College or above degree e.g. bachelor	146 (44.9)	179 (55.1)	-	-
• High school	38 (46.9)	43 (53.1)	0.92 (0.57-1.51, p=0.748)	0.90 (0.52-1.56, p=0.699)
Educational background				
• Health-related sciences	85 (43.6)	110 (56.4)	-	-
• Non-health-related sciences	99 (46.9)	112 (53.1)	0.87 (0.59-1.29, p=0.501)	0.65 (0.40-1.05, p=0.079)
Monthly income				
• 565 USD or Less	128 (49.4)	131 (50.6)	-	-
• 565 USD – 1128 USD	33 (36.3)	58 (63.7)	1.72 (1.06-2.83, p=0.031)	1.40 (0.80-2.47, p=0.241)
• 1128 - 1693 USD	9 (30.0)	21 (70.0)	2.28 (1.04-5.42, p=0.048)	1.99 (0.83-5.05, p=0.132)
• More than 1693 USD	14 (53.8)	12 (46.2)	0.84 (0.37-1.88, p=0.667)	0.61 (0.25-1.47, p=0.273)
Diagnosed with a chronic illness e.g. diabetes or hypertension				
• No	160 (46.9)	181 (53.1)	-	-
• Yes	24 (36.9)	41 (63.1)	1.51 (0.88-2.64, p=0.140)	1.41 (0.74-2.74, p=0.303)
Received COVID vaccine				
• No	7 (46.7)	8 (53.3)	-	-
• Yes	177 (45.3)	214 (54.7)	1.06 (0.36-3.00, p=0.915)	1.04 (0.33-3.15, p=0.951)
Infected by COVID				
• No	98 (58.3)	70 (41.7)	-	-
• Yes	86 (36.1)	152 (63.9)	2.47 (1.65-3.72, p<0.001)	2.44 (1.59-3.77, p<0.001)
A family member, friend, colleague or relative died due to COVID infection				
• Not sure	11 (55.0)	9 (45.0)	-	-
• Yes	102 (41.6)	143 (58.4)	1.71 (0.68-4.40, p=0.250)	1.13 (0.41-3.17, p=0.807)
• No	71 (50.4)	70 (49.6)	1.21 (0.47-3.16, p=0.698)	1.10 (0.40-3.12, p=0.852)

Table 4 presents the results of the regression analysis examining the factors influencing participants' COVID-19 preventive practices. Among the notable findings, age demonstrated a trend towards significance in multivariable analysis, with individuals aged 20-29 and 30-39 years showing a slightly higher likelihood of favorable practices

compared to those over 40 years old. Although the p-values for age did not reach conventional significance levels, they suggest a potential age-related influence on preventive practices. Gender did not exhibit a statistically significant association with practice outcomes. While males appeared to have slightly higher odds of favorable

practices, the results did not achieve significance in either univariable or multivariable analysis. Monthly income levels showed interesting patterns. Participants with incomes between \$565 and \$1,128 per month had significantly higher odds of favorable practices compared to those earning less than \$565. This finding suggests a potential economic dimension to preventive behaviors.

The most substantial and statistically significant predictor of favorable practices was a history of COVID-19 infection. Individuals who had been infected with COVID-19 had significantly higher odds of engaging in favorable practices, with an odds ratio (OR) of 2.44 in multivariable analysis. This underscores the impact of personal experience with the virus on adherence to preventive measures.

DISCUSSION

We conducted this study in Jordan to assess adherence to preventive practices during the COVID-19 pandemic among the general population. The study indicated that only half of the population had a favorable level of practice or good adherence to protective measures. A similar result was found in a study in Palestine, where participants had an average score of 50.2% (14). In contrast, studies in the UAE and Iraq reported total scores of 90% and 76%, respectively, for practice questions (15,16). Another study in Palestine showed a generally high level of acceptance of government regulations during the pandemic (17).

The present study indicated that the highest level of adherence was observed in using masks, gloves, hand sanitizers, and/or other antiseptics. This may be attributed to the increased availability of personal protective equipment during the pandemic and the growing culture of proper hand washing (18). These findings support a prior study conducted in Jordan, which summarized safety procedures followed by the majority of neighborhood pharmacies to protect both employees and clients from contracting the virus. The study found that since the pandemic began, about 94% of pharmacists have worn

personal protective equipment, while 82% of pharmacies routinely sterilize the premises and the primary door handle, and 82% of pharmacies provide gloves, medical masks, and alcohol at the entrance (19). Additionally, another study in Jordan examining knowledge and practices related to disinfectants and sanitizers during the COVID-19 pandemic found that Jordanian adults increased their use of disinfectants during the outbreak. Although few high-risk activities were identified, research participants generally demonstrated positive practices regarding the use of chemical disinfectants. Interestingly, awareness of the safe and effective use of antimicrobials had little to no impact on the positive behaviors adopted by Jordanian adults (20).

Similarly, other studies in the UAE and Palestine revealed that most of the population agreed on the importance of wearing masks (15,17). The use of hand sanitizers, rubbing alcohol, or other antiseptics was also widely supported in Iraq and Palestine (16,17). Our study showed a good level of practice in using disinfectants among participants, with a mean score of 4.1 out of 5. Another study in Palestine reported that around 68% of participants agreed on the use of disinfectants (14). The current study's results further support a relevant study conducted in Kuwait, which evaluated the parameters associated with beneficial behaviors and compliance with preventive measures among the Kuwaiti community during the COVID-19 pandemic.

In that study, a convenience sample of the Kuwaiti population was surveyed online, and 389 completed questionnaires were evaluated. The analysis revealed that the majority of participants (81.2%) had no congenital or chronic illnesses and were female (59.4%). The COVID-19 infection rate was 54.8%. During the COVID-19 epidemic, more than half of the participants (54.8%) engaged in positive behaviors. Significant differences in medical history and COVID-19 infection history were found between the groups with favorable and unfavorable practices. Approximately 65.3% of those with favorable

practices had been infected with COVID-19 at least once, compared to only 42% of those with unfavorable practices. Similarly, 23.9% of the favorable group and only 12.5% of the unfavorable group had a history of congenital or chronic diseases. The results of the multivariate analysis indicated that prior COVID-19 infection significantly increased the likelihood of having beneficial behaviors. Likewise, having a history of a congenital or chronic illness significantly raised the likelihood of having positive practices (21).

Our analysis revealed that the lowest level of compliance during the COVID-19 pandemic was in following a balanced diet, with a mean score of only 3.5 out of 5. Another study in Palestine showed that 71.7% of participants adhered to a balanced diet (13). Despite the fact that the U.S. National Institutes of Health does not endorse any prophylactic treatments against COVID-19 (21), our study found good adherence among participants to consuming supplements to boost immunity, such as Vitamin C, Zinc, and Magnesium, with a mean score of 3.9 out of 5. A study conducted in Kuwait, which assessed the influence of the COVID-19 pandemic on the purchasing intention of vitamins, revealed that health consciousness positively affected attitudes toward vitamins, thereby increasing purchasing intentions. This could be attributed to heightened health consciousness during the pandemic and more positive attitudes toward supplements and vitamins due to their perceived role in boosting immunity (22). A study aimed at evaluating changes in patient demand for drug and non-drug items in community pharmacies in Jordan during the COVID-19 pandemic found that all participants reported an increase in the demand for minerals and vitamins compared to previous years. This rise in demand can be attributed to the inclusion of these supplements in Jordan's Ministry of Health's treatment protocol for mild COVID-19 cases (23).

Avoiding crowded public spaces was recommended during the COVID-19 era, and our study detected relatively good compliance with this recommendation,

with a mean score of 3.8 out of 5. High levels of acceptance and compliance with this measure were also reported in studies conducted in the UAE and Palestine (15,17).

Throughout the epidemic, approximately 57% of participants were infected with COVID-19 at least once. Compliance with precautions was shown to improve with prior exposure to COVID-19. A related study in Palestine (14) found a statistically significant correlation between prior infection and adherence to preventive measures. Notably, a large proportion of our participants had already been vaccinated against COVID-19, with at least one dose.

These results confirm findings from previous research conducted in Jordan. A cross-sectional survey evaluating awareness and attitudes towards COVID-19 vaccination revealed a fairly high level of awareness about the COVID-19 vaccine, with 51.4% of participants perceiving the importance of vaccination. However, only 37.1% agreed that the newly developed vaccine was safe, and 77.4% expressed a preference for natural immunity. Overall, the attitude towards COVID-19 vaccination was cautiously optimistic, with 60.2% of respondents scoring above Bloom's 60.0% cutoff point, despite mixed opinions on vaccine safety and necessity (23).

Many people are reluctant to be vaccinated for various reasons, including misunderstandings and distrust (24), which is a major issue worldwide. Increased vaccine availability and accessibility, public health campaigns, and trust in healthcare institutions (25) may all contribute to higher vaccination uptake rates among the study group.

The purpose of a descriptive questionnaire-based cross-sectional survey among the Jordanian population was twofold: (1) to evaluate the prevalence of COVID-19 in Jordan and (2) to identify socio-demographic and behavioral predictors of infection, with an emphasis on the use of preventive measures (PPMs). Our final statistical analyses included data from 7,746 individuals. The descriptive data revealed that 82.6% of people believed wearing a face mask would protect them from contracting COVID-19. Approximately 69.5% were adamant about

using a face mask, whereas 65% were committed to using hand sanitizer. Female gender (AOR = 1.2; 95% CI: 1.07-1.35; $p = 0.002$), having a close relative with COVID-19 (AOR = 8.5; 95% CI: 7.51-9.70; $p = 0.001$), and employment or education in the healthcare field (AOR = 1.2; 95% CI: 1.09-1.38; $p = 0.001$) were associated with higher adherence to preventive measures. However, the belief that face masks do not protect against COVID-19 was also a factor (AOR = 1.3).

The authors observed that adherence to non-pharmaceutical interventions (NPIs) such as mask use, hand washing, and social isolation fell short of ideal levels among Jordanians. This may be why the COVID-19 infection rate has surged in recent months throughout the nation. A third wave could be devastating, and comparable infectious dangers in the future could be mitigated through more long-term health promotion and stringent policy initiatives (26).

The study's results carry significant implications for the post-COVID-19 period. Firstly, the finding that individuals who have previously been infected with COVID-19 are more likely to exhibit favorable preventive practices underscores the power of personal experience. Moving forward, public health authorities and policymakers should consider tailoring their messages and campaigns to leverage these personal experiences. Stories and testimonials from survivors and those who have battled the virus can be instrumental in emphasizing the importance of preventive measures, potentially resonating more strongly with individuals who have directly experienced the impact of COVID-19.

Furthermore, the study suggests age-related influences on preventive practices, with individuals aged 20-29 and 30-39 showing a slightly higher likelihood of engaging in favorable practices compared to those over 40 years old. Although these differences did not reach conventional significance levels, they hint at a potential generational divide in behavior. In the post-pandemic period, it would be prudent for public health strategies to consider the

unique perspectives and needs of different age groups. Tailored educational campaigns and interventions can be designed to address the specific concerns and motivations of these distinct age cohorts, ensuring a more effective and targeted approach to promoting preventive practices.

Additionally, the study's examination of monthly income levels reveals an intriguing economic dimension to preventive behaviors. Participants with higher incomes, particularly those earning between 565 USD and 1128 USD per month, displayed significantly higher odds of favorable practices. This finding highlights the need for equitable access to resources and information in the post-COVID era. Policymakers should focus on addressing economic disparities to ensure that preventive measures remain accessible to all socioeconomic groups. Efforts to provide financial support, affordable healthcare, and resources for preventive tools like masks and sanitizers can contribute to a more equitable approach to pandemic management.

RECOMMENDATIONS:

Our results suggest that extensive and targeted public awareness campaigns should be initiated. The elements of the protective measures should be discussed thoroughly and explained in both Arabic and English. We can leverage individuals with higher education levels and good compliance with these measures to help understand and reach all other population groups. Moreover, governments should work on building trust among the population to facilitate adherence to recommendations and instructions.

Implications of Study Results on the Post COVID-19 period

1- The study emphasizes the need for continued public health messaging and instruction regarding the importance of maintaining preventive measures even after the pandemic's peak. Although vaccination rates have been favorable, there is a risk of complacency as the pandemic recedes. It is imperative to maintain awareness and highlight the ongoing importance of behaviors such as mask-wearing and hand hygiene.

2- The reduced adherence to dietary recommendations suggests that tailored initiatives are needed to promote healthy eating patterns during the post-pandemic phase. Public health initiatives should emphasize the role of nutrition in maintaining overall health and combating infectious diseases.

3- Understanding the factors influencing compliance, such as a history of COVID-19 infection, can inform future outbreak response efforts. Public health officials can use these insights to target specific population groups and enhance preparedness and response strategies.

4- The study's high vaccine uptake rates are encouraging and reflect a level of confidence in immunization campaigns. For the post-pandemic period, it is crucial to sustain and expand this confidence to ensure continued vaccine coverage for COVID-19 and other preventable diseases.

5- These results can be generalized to other nations and regions facing similar issues. The lessons learned from Jordan's experience with COVID-19 compliance can inform global health policies, particularly in areas where vaccine hesitancy remains a challenge.

6- In the post-pandemic phase, healthcare systems can optimize resource allocation by understanding the factors affecting compliance. By identifying high-risk groups and tailoring interventions to meet their specific needs, resource use can be more effectively managed.

CONCLUSIONS

The findings of this study provide valuable insights into the factors influencing individuals' adherence to COVID-19 preventive practices during the pandemic and offer guidance for the post-COVID-19 period. The significant impact of personal experience with COVID-19 infection on the likelihood of engaging in favorable preventive practices underscores the importance of relatable messaging and testimonials in public health campaigns. Leveraging firsthand experiences can be a powerful tool for encouraging continued adherence to preventive measures in the future.

While age-related trends in preventive practices were observed, they did not reach statistical significance. However, this hints at potential generational differences in behavior that merit further exploration and targeted interventions. Public health strategies should consider tailoring their approaches to address the unique concerns and motivations of different age groups, recognizing that one-size-fits-all approaches may not be as effective.

Additionally, the influence of monthly income on preventive practices highlights the need for equitable access to resources and support. In the post-COVID-19 era, policymakers should prioritize measures that reduce economic disparities, ensuring that preventive tools and healthcare remain accessible to all segments of the population.

As we transition into the post-pandemic period, these insights provide a roadmap for public health authorities and policymakers to continue fostering a culture of prevention. By leveraging personal experiences, addressing age-specific needs, and promoting economic equity, we can better navigate the challenges that lie ahead and sustain the progress made in managing ongoing and future health crises.

Declarations:

Ethical considerations

This was an observational study with no interventions or experimental procedures. It was conducted in accordance with the principles outlined in the Declaration of Helsinki. Participation in this survey was voluntary, and participants provided informed consent before completing the questionnaire. Anonymity and confidentiality were maintained throughout the study, including during data collection and analysis.

Consent for publication

Not applicable

Acknowledgments

We would like to thank all the participants for their time and participation with us.

Funding statement

This research received no funding.

Conflict of Interests

The authors declare no conflict of interest.

Availability of data and materials

Data are available upon reasonable request from the corresponding author.

REFERENCES

1. WHO Coronavirus (COVID-19) Dashboard | WHO Coronavirus (COVID-19) Dashboard With Vaccination Data. Available from: https://covid19.who.int/?adgroupsurvey={adgroupsurvey}&gclid=CjwKCAjwue6hBhBVEiwA9YTx8OpUo9DxKRT1x4QSG4fxc9wAZlgVPv0OVUFJ3-ligCK4PdVWFeEmeRoChL8QAvD_BwE
2. Wang C., Horby P.W., Hayden F.G., Gao G.F. A novel coronavirus outbreak of global health concern. *The Lancet*. 2020 Feb;395(10223): 470–3.
3. Pandey S., Gupta A., Bhansali R., Balhara S., Katira P., Fernandes G. Corona Virus (Covid-19) Awareness Assessment - A Survey Study Amongst the Indian Population. *Journal of Clinical and MEDical Research* [Internet]. 2020 Apr;2(4). Available from: <https://maplespub.com/article/Corona-Virus-COVID-19-Awareness-Assessment-A-Survey-Study-Amongst-the-Indian-Population>
4. Khmour, M., & Obayat, A. Association between ABO Blood Group System and the Severity of COVID-19 in the West Bank: A Case-control Study. *Jordan Journal of Pharmaceutical Sciences*, 2024;17(2): 371-382.
5. Advice for the public: Coronavirus disease (COVID-19). Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public?gclid=Cj0KCQjwirz3BRDARIsAlmf7LMdSuXyVXneEkeTMD1Jq7-oCPpehC-3xpt55tUS7cBsyyQYot6QZGEaAsmDEALw_wcB
6. Feng S., Shen C., Xia N., Song W., Fan M., Cowling B.J. Rational use of face masks in the COVID-19 pandemic. *The Lancet Respiratory medicine*. 2020 May;8(5): 434–6.
7. Qerem W.A., Alassi A., Alazab J., Eberhardt J., Moh'd Kalloush H., Alarwany R. Knowledge and Attitude towards Vaginoplasty and Perineoplasty among Jordanian Females. *Jordan Journal of Pharmaceutical Sciences*. 2024;17(2): 383–94.
8. Rajbanshi M., Bhusal S., Paudel K., Poudel B., Gaire A., Khatri E., et al. Knowledge, attitude, and practice of Nepalese residents in the prevention and control of COVID-19: A cross-sectional web-based survey. *Annals of Medicine and Surgery*. 2022 Dec;84: 104861.
9. Isah M.B., Abdulsalam M., Bello A., Ibrahim M.I., Usman A., Nasir A., et al. Coronavirus Disease 2019 (COVID-19): Knowledge, attitudes, practices (KAP) and misconceptions in the general population of Katsina State, Nigeria. *medRxiv*. 2020 Jun;2020.06.11.20127936.
10. Chacón F.R., Doval J.M., Rodríguez V.I., Quintero A., Mendoza D.L., Mejía M.D., et al. Knowledge, attitudes, and practices related to COVID-19 among patients at Hospital Universitario de Caracas triage tent: A cross-sectional study. *Biomedica: revista del Instituto Nacional de Salud*. 2021;41(Sp. 2): 1–35.
11. Ahdab S.A. A cross-sectional survey of knowledge, attitude and practice (KAP) towards COVID-19 pandemic among the Syrian residents. *BMC public health* [Internet]. 2021 Dec;21(1). Available from: <https://pubmed.ncbi.nlm.nih.gov/33546652/>
12. Masoud A.T., Zaazouee M.S., Elsayed S.M., Ragab K.M., Kamal E.M., Alnasser Y.T., et al. KAP-COVIDGLOBAL: a multinational survey of the levels and determinants of public knowledge, attitudes and practices towards COVID-19. *BMJ open* [Internet]. 2021 Feb;11(2). Available from: <https://pubmed.ncbi.nlm.nih.gov/33622949/>

13. Abouzid M., El-Sherif D.M., Eltewacy N.K., Dahman N.B.H., Okasha S.A., Ghozy S., et al. Influence of COVID-19 on lifestyle behaviors in the Middle East and North Africa Region: a survey of 5896 individuals. *Journal of Translational Medicine*. 2021 Dec;19(1).
14. Nazzal Z., Maraqa B., Banat L., Kittaneh M., Maa'li Y., Al-Shobaki S. The practice of COVID-19 preventive measures in Palestine on the limits of vaccine provision: a population-based study. *J Infect Dev Ctries*. 2022 Jan 31;16(01): 81–9.
15. Saeed B.Q., Elbarazi I., Barakat M., Adrees A.O., Fahady K.S. COVID-19 health awareness among the United Arab Emirates population. *PLOS ONE*. 2021 Sep 13;16(9): e0255408.
16. Saeed B.Q., Al-Shahrabi R., Bolarinwa O.A. Socio-demographic correlate of knowledge and practice toward COVID-19 among people living in Mosul-Iraq: A cross-sectional study. *PLOS ONE*. 2021 Mar 31;16(3): e0249310.
17. Salameh B., Basha S., Basha W., Abdallah J. Knowledge, Perceptions, and Prevention Practices among Palestinian University Students during the COVID-19 Pandemic: A Questionnaire-Based Survey. *Inquiry*. 2021 Dec; 58: 46958021993944.
18. Kyei-Arthur F., Agyekum M.W., Afrifa-Anane G.F., Larbi R.T., Kisaakye P. Perceptions about COVID-19 preventive measures among Ghanaian women. *PLoS One*. 2023;18(4): e0284362.
19. Obeidat, M. S., Alyahya, L. A., Obeidat, E. S., Obeidat, A., & Mukattash, T. L. Safety Practices in Community Pharmacy during COVID-19 Pandemic in Jordan. *Jordan Journal of Pharmaceutical Sciences*. 2023; 16(1): 11-17.
20. Bardaweel, S. K., AlMuhaissen, S. A., Abdul-Hadi, A. A., Al-Masri, Q. S., & Musleh, H. R. Knowledge and Practices of Disinfectants and Sanitizers Use during COVID-19 Pandemic in Jordan. *Jordan Journal of Pharmaceutical Sciences*. 2023; 16(1): 82-95.
21. Ghaith, A., Bairmani, Z. A., & Ali, H. T. Preventive Practices among the Kuwaiti Population During and after the COVID-19 Pandemic. 2023.
22. Ghaith, A., Echchad, M., AlHaman, F., & Al-Shalby, R. Assessing the Influence of the COVID-19 Pandemic on the Purchasing Intention of Vitamins in Kuwait using the Theory of Planned Behavior. *Jordan Journal of Pharmaceutical Sciences*. 2023;16(3): 565-577.
23. Elayeh E.R., Haddadin R.N., Dawud R.J. Navigating Changes in Patient Drug and Non-Drug Item Demands in Community Pharmacies Amidst the COVID-19 Pandemic: Changes in drug demand during COVID19. *Jordan Journal of Pharmaceutical Sciences*. 2024; 17(1): 31–44.
24. MacDonald N.E. Vaccine hesitancy: Definition, scope and determinants. *Vaccine*. 2015 Aug 14;33(34): 4161–4.
25. Freeman D, Loe BS, Chadwick A, Vaccari C, Waite F, Rosebrock L, et al. COVID-19 vaccine hesitancy in the UK: the Oxford coronavirus explanations, attitudes, and narratives survey (Oceans) II. *Psychol Med*. 2022 Oct; 52(14): 3127–41.
26. Khatatbeh M., Al-Maqableh H.O., Albalas S., Al Ajlouni S., A'aqoulah A., Khatatbeh H., Kasasbeh M.A., Khatatbeh I., Albalas R., Al-Tammemi A.A. Attitudes and commitment toward precautionary measures against COVID-19 amongst the Jordanian population: A large-scale cross-sectional survey. *Frontiers in Public Health*. 2021 Nov 8; 9: 745149.

امثال السكان الأردنيين لإجراءات الحماية أثناء وبعد جائحة كورونا-19؛ دراسة على مستوى البلاد

أبرار غيث¹، زينه عقيل بيرماني²، محمد ياسر مسعود³، خديجة الفروخ⁴، حسام ثروت علي^{5*}

¹ قسم الاقتصاد والاعمال، جامعة ديبرسن، المجر .

² جامعة توماس جيفرسون، أمريكا، بنسلفانيا.

³ كلية العلوم، جامعة الأزهر، مصر .

⁴ قسم الامراض الباطنية، مستشفى الأوغستا فكتوريا (المطلع)، القدس، فلسطين

⁵ كلية طب قنا، جامعة جنوب الوادي، قنا، مصر .

ملخص

الخلفية: انتشرت جائحة كوفيد-19 على مستوى العالم، حيث بلغ عدد الحالات المؤكدة أكثر من 105 ملايين حالة و2.3 مليون حالة وفاة حتى شباط 2021. ويعتبر الامثال للتدابير الوقائية ضروريًا لمكافحة الوباء.

الأهداف: تقييم مدى التزام السكان الأردنيين بالإجراءات الوقائية أثناء وبعد جائحة كورونا -19 .

الطرق: استطلعت هذه الدراسة المقطعية عموم السكان في الأردن الذين تتراوح أعمارهم 18 عامًا فما فوق باستخدام استبيان عبر الإنترنت تم توزيعه في الفترة من آذار إلى تموز 2022. وقد تم تقسيم الاستبيان إلى قسمين: أسئلة ديموغرافية وأخرى عملية. تم جمع البيانات باستخدام نماذج جوجل (Google) وتحليلها باستخدام برنامج R الإحصائي.

النتائج: كان معظم المشاركين البالغ عددهم 409 تحت سن 30 عامًا (65.5%)، والإناث (70%)، وكان لديهم شهادة جامعية أو درجة أعلى (80%). أصيب حوالي 57% بفيروس كورونا مرة واحدة على الأقل بينما توفي 60% لدى منهم قريب أو صديق أو زميل بسبب الإصابة بكورونا -19. وكان لدى أكثر من نصف المشاركين (54%) ممارسات إيجابية. كشف التحليل متعدد المتغيرات أن الإصابة السابقة بفيروس كورونا تزيد بشكل كبير من احتمالات وجود ممارسات إيجابية ($p < 0.001$; OR=2.44; CI[1.59-3.77]).

خاتمة: وسلطت هذه الدراسة الضوء على مدى التزام الأردنيين بالإجراءات الوقائية، حيث كان لدى ما يقرب من النصف ممارسات إيجابية والتي تزداد مع الإصابة السابقة بفيروس كورونا.

الكلمات الدالة: كوفيد-19، وقائي، الأردن.

* المؤلف المراسل: حسام ثروت علي

hossamtharwatali@gmail.com

تاريخ استلام البحث 2023/05/11 وتاريخ قبوله للنشر 2024/03/09.