

Perception and Willingness to Use Telepharmacy Among the General Population in Jordan

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Objective: This research aimed to explore how telepharmacy is perceived, whether it would be willingly used by the overall population in Jordan, and the associated socioeconomic disparities that might affect its acceptance.

Methods: This is a survey-based cross-sectional study involving the general public of Jordan. The study took place in various Jordanian cities from May 2nd to June 1st, 2023. Using Google forms, the questionnaire was shared through various social media channels (such as Facebook and WhatsApp).

Results: The questionnaire received responses from 800 participants. The data showed that a sizable portion of the Jordanian population were unaware of telepharmacy (n= 343, 42.9%), and a majority had never utilized it (n= 131, 16.4%). The participants viewed the main advantage of telepharmacy as minimizing unnecessary trips to pharmacies (n= 668, 83.5%) and reducing travel time and expenses (n= 632, 79.0%). However, the primary concern was the mental effort required to use this service (n= 465, 58.1%). Of the respondents, 61.3% (n= 490) indicated a willingness to adopt telepharmacy services in the future. Regression analysis indicated that men were more likely to use this service compared to women (OR= 1.947, p<0.001), and people living in northern and southern Jordan exhibited a greater willingness compared to those inhabiting the central region (OR= 2.168, p<0.001).

Conclusion: The results reveal a positive attitude towards and a significant readiness to embrace telepharmacy among the Jordanian population. However, for broader acceptance and utilization, apprehensions regarding the service need to be addressed. Doing so could improve access to pharmaceutical care, particularly for patients living in far-flung areas of Jordan.

Keywords: telepharmacy, public, perception, willingness, Jordan

Introduction

Telehealth is the provision of medical services and health care remotely, using information technology and communication tools.¹ Several are the fields of telehealth, with telepharmacy referring to the use of telecommunication to deliver patients' pharmaceutical care.² This virtual approach of healthcare provision can be particularly useful among patients living in rural areas, where appropriate pharmaceutical care services are not available, or when such service cannot be provided in-person.³

After the spread of COVID-19, the use of telepharmacy increased significantly to account for the lack of in-person consultation, as a way to provide optimal management to patients requiring pharmaceutical care during the pandemic.⁴⁻⁶ As a result, the traditional way to provide pharmacotherapy care has been combined with information technology solutions that were quickly integrated in the pharmacy practice framework, opening the opportunity to embrace related trainings into the pharmacy curricula.^{4,5,7}



Advantages of telepharmacy include the reduction of treatment-related problems, increase adherence to medication, reduce adverse drug events and improve medication use outcomes thus enhancing the quality of pharmacy services provided to patients.^{8,9} It has been also showed to reduce hospital admissions during the pandemic, diminish burden on hospitals, and save time to patients and staff.^{4,10,11} Telepharmacy allows for a personalized interaction between the patient and the pharmacist to include patient-care services such as counseling, assessment of medication adherence, as well as comprehensive medication review.^{2,8,12}

Jordan, a developing Middle Eastern country, had a population of around 10.2 million in 2020, with an average age of 22.8 and a slightly higher male-to-female ratio. The majority are Arab Muslims, and the literacy rate was 98% in 2015.¹³ In Jordan, the provision of pharmaceutical care is very satisfactory among the Jordanian community although pharmacies still adopt the conventional system to provide pharmaceutical care services, with only a few instances of limited consultations through social media.¹⁴ No telepharmacy has been ever implemented with a number of scientific reports addressing the need for such services.^{15,16} In order to implement it and optimize its use, efforts are needed providing pharmacists and the community with the appropriate knowledge and digital health to assure a good, equitable and ethical access to this technology.¹⁷ An important step to start with is understanding the perception/willingness of Jordanians toward the use of telepharmacy and investigating the sociodemographic characteristics that can mostly impact it.

In a recent study conducted in Jordan, pharmacists expressed a positive attitude to the implementation of telepharmacy.¹⁸ On the same line, Jordanians showed to have favorable perceptions towards telemedicine.¹⁹ Nonetheless, no information is available regarding the use of telepharmacy among Jordanians. This study thus aimed to investigate the perception and willingness to use telepharmacy among the general population in Jordan as well as to investigate the socioeconomic disparities in patient use of telepharmacy.

Materials and Methods

Study Design, Setting, and Sampling Method

This was a survey-based cross-sectional study conducted among the general Jordanian public. Participants were recruited from different Jordanian cities between May 2nd, 2023, and June First, 2023. Inclusion criteria was any Jordanian aged 18 years or above currently living in Jordan. The study questionnaire was uploaded to the Google form platform. A convenient sampling method was utilized through snowball effect and distribution of the online questionnaire via different social media platforms (Facebook and WhatsApp). A trained research assistant provided participants with a link to fill the form and a cover letter at the beginning of the questionnaire explained to the participants the goals of the study and guaranteed the anonymity of the participants. Each participant was also requested to invite others from their network to participate. The research assistant conducted regular follow-ups during data collection to ensure representation from various settings and entities within Jordanian society.

Development of the Survey

The initial draft of the study questionnaire was developed following extensive literature review of previous studies that evaluated public and healthcare providers' knowledge, perceptions, and readiness towards the implementation of telepharmacy and telemedicine services.¹⁹⁻²¹ Following that, four independent experts conducted content and face validation, reviewed the initial draft of the questionnaire, and appropriate modifications were made accordingly.

The questionnaire's final version ([Supplementary File](#)) contained seven sections. The first section comprised the sociodemographic characteristics of the participants. The second part included closed-ended questions to evaluate public awareness of telepharmacy services. The third and fourth parts evaluated the perceived benefits and concerns by the public related to the implementation of telepharmacy. The last part assessed the willingness of the public to use telepharmacy services. A Likert scale of five points that ranged between strongly agree (5) to strongly disagree (1) was employed to evaluate public perceived benefits and concerns (sections three and four).

Prior to distributing the survey, a preliminary assessment was conducted with a group of ten individuals. These participants were asked to assess the organization, comprehensibility, and length of the survey, as well as to provide their overall feedback. The results from the pilot testing were excluded from the eventual data analysis. Following pilot

testing, Cronbach alpha values of 0.900, and 0.867 were reported for sections three and four, respectively, indicating that the internal consistency of the questionnaire items was acceptable.²²

Sample Size Calculation

The sample size was determined based on the requirement of logistic regression analysis as per the recommendation of Fidell's and Tabachnick.²³ Based on their recommendations; 5–20 subjects are needed for each independent predictor. Using the upper limit, which is 20 subjects per predictor and having 10 predictors, the minimum sample size required was estimated at 200 subjects.

Ethical Approval

The Institutional Review Board (IRB) of the Private Applied Sciences University, Jordan, approved the study's protocol (Approval number: 2023-PHA-23). Prior to filing out the study questionnaire, all participants provided their electronic consent of participation. The questionnaire includes a statement for volunteer participation, and participants confirmed their consent by selecting the "agree to participate" option before proceeding to the study questions. The current study was done following the Declaration of Helsinki of the World Medical Association.

Statistical Analysis

The Excel sheet obtained from Google Forms was downloaded and then exported to the Statistical Package for Social Science (SPSS) version 22 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were presented as frequency and percentage of qualitative variables and median and interquartile range (IQR) for quantitative variables. Normality was tested via the Shapiro–Wilk test. The $P \leq 0.05$ indicated non-normal distribution.

Logistic regression analysis was carried out for possible predictors of the participants' willingness to use telepharmacy services. Simple logistic regression was conducted to identify variables with P-value less than 0.250 which were then included in subsequent multiple logistic regression analysis. Before carrying out multiple logistic regression, absence of multicollinearity among variables was checked (Pearson correlation coefficient between any two variables should be less than 0.9). Internal consistency of the questionnaire was confirmed, Cronbach alpha value was more than 0.70.²² P-value ≤ 0.05 was considered statistically significant.

Results

A total of 800 participants responded and filled the questionnaire, most of them were women (n= 517, 64.6%). Participants had a median age of 33.0 years (IQR= 20.0), and almost two-thirds of the participants had an education higher than high school (n= 578, 72.3%). Over half of the participants had low monthly income (lower than 400 JOD) (n= 469, 58.6%), and around 39% had a biomedical-related degree (n= 313, 39.1%). Among the study participants, 19.3% reported to have chronic diseases (n= 154), and many of them are frequent visitors of the pharmacy with 2 or more visits per month (n= 346, 45.5%). The general characteristics of the participants are shown in [Table 1](#).

Telepharmacy is a new concept in Jordan, this explains the fact that 42.9% of participants (n= 343) have never heard of telepharmacy, and the percentage of those who used telepharmacy is even lower (n= 131, 16.4%), [Figure 1](#).

Telepharmacy can help provide convenience and easier access to pharmaceutical services. The public acknowledged these benefits of telepharmacy, the most important was decreasing unnecessary visits to pharmacies (n= 668, 83.5%), followed by the reduction in travel time and costs (n= 632, 79.0%), protection of patients in pandemics (n= 631, 78.9%), and saving the waiting time problem in most pharmacies (n= 621, 77.6%). More details about participants' perceived benefits of telepharmacy are presented in [Table 2](#).

The concerns on the use of telepharmacy that the participants revealed ([Table 3](#)) were the mental effort it required (n= 465, 58.1%), subsequent communication and medication errors that could happen when drug orders and pharmaceutical care services are not delivered in person (n= 464, 58.0%). In general, half of the study population still did not perceive the suggested concerns as problematic.

Among the study participants, 61.3% (n= 490) reported that they are willing to use telepharmacy services in the future, the remaining participants were either hesitant (n= 224, 28.0%) or unwilling (n= 86, 10.8%) to use the services.

Table 1 Sociodemographic Characteristics of the Study Participants (N= 800)

Parameters	Median (IQR)	n (%)
Age (years)	33.0 (20.0)	
Gender		
o Female		517 (64.6)
o Male		283 (35.4)
Educational level		
o Not educated		29 (3.6)
o School level		193 (24.1)
o University students		188 (23.5)
o University graduate		303 (37.9)
o Post-graduate		87 (10.9)
Marital status		
o Married		463 (57.9)
o Others (Single, divorced, or widowed)		337 (42.1)
Do you have children?		
o No		365 (45.6)
o Yes		435 (54.4)
Monthly income*		
o <400 JD		469 (58.6)
o 401–800 JD/month		278 (34.8)
o 801–1200 JD/month		35 (4.4)
o >1200 JD/month		18 (2.3)
Place of residence		
o Centre of Jordan		226 (28.3)
o North of Jordan		541 (67.6)
o South of Jordan		33 (4.1)
Do you have biomedical-related degree?		
o No		487 (60.9)
o Yes		313 (39.1)
Do you suffer from chronic diseases?		
o No		646 (80.8)
o Yes		154 (19.3)
Frequency of visiting a community pharmacy per month		
o 0–1 time/month		436 (54.5)
o ≥2 times/month		364 (45.5)

Note: *1 JD equals to 1.41 US Dollar.

Abbreviations: IQR, Interquartile range; JD, Jordanian Dinar.

When the participants who were willing to use the service were introduced to the different services that can be obtained through telepharmacy, most of them were willing to benefit from remote patient counseling (n= 444, 90.6%). Home medication review was another telepharmacy activity that many participants were willing to use (n= 431, 88.0%). Although remote medication dispensing (n= 389, 79.4%) had lower public acceptance, all other activities received over 80% approval, highlighting strong overall telepharmacy acceptance as shown in [Figure 2](#).

Finally, logistic regression analysis was performed to assess predictors affecting participants' willingness to use telepharmacy service ([Table 4](#)), and results showed that males were more willing to use the service than females (OR=

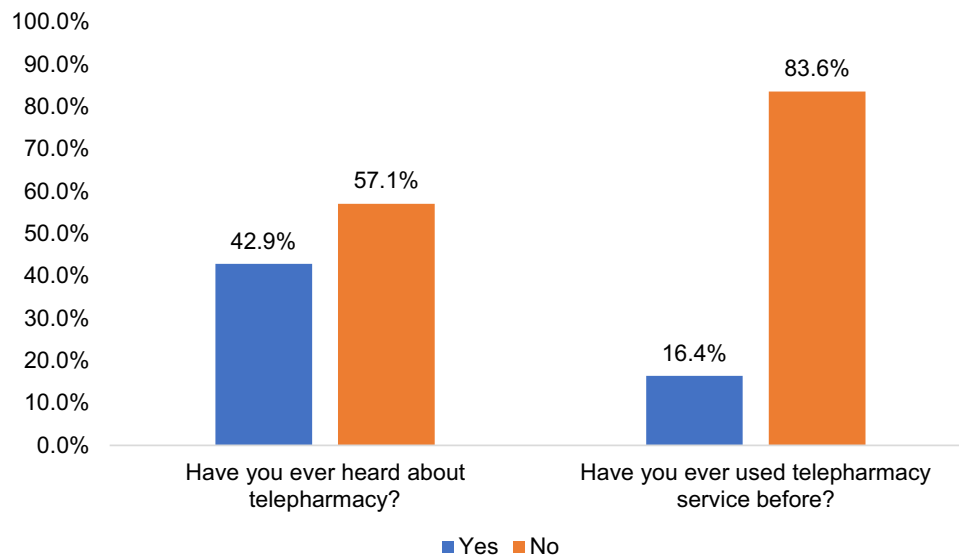


Figure 1 Participant's awareness and previous use of telepharmacy services (n= 800).

1.947, $p < 0.001$). Moreover, participants living in the north and south of Jordan were more willing to use the service compared to those living in the center of Jordan (OR= 2.168, $p < 0.001$). The logistic regression model had an acceptable fit, $\chi^2 (8) = 13.350$, $p = 0.100$ (Hosmer–Lemeshow goodness-of-fit). The model explained 8.4% (Nagelkerke R^2) of participants' willingness to use telepharmacy service and correctly classified 65.1% of cases.

Discussion

This study came to investigate the perception and willingness to use telepharmacy among the general population in Jordan and the related socioeconomic disparities to using this service, as such understanding is crucial to comprehend the acceptance, introduction, and optimization of telepharmacy.

Table 2 Participants' Perceived Benefits of Telepharmacy (N= 800)

Statements	Participant' Responses n (%)		
	Strongly Agree/ Agree	Neutral	Strongly Disagree/ Disagree
Telepharmacy helps in reducing unnecessary visits to pharmacies	668 (83.5)	105 (13.1)	27 (3.4)
Telepharmacy improves patients' medication adherence	528 (66.0)	216 (27.0)	56 (7.0)
Telepharmacy helps patients save their money to reach the pharmacies	616 (77.0)	138 (17.3)	46 (5.6)
Telepharmacy helps patients save their travel time to reach the pharmacies	632 (79.0)	115 (14.4)	53 (6.6)
Information technology knowledge is important for patients on how to conduct telepharmacy	598 (74.8)	157 (19.8)	45 (5.6)
Telepharmacy solves the waiting time problem in most pharmacies	621 (77.6)	128 (16.0)	51 (6.4)
Telepharmacy protects patients during pandemics	631 (78.9)	132 (16.5)	37 (4.6)
Telepharmacy is effective in providing health education and patient counseling	555 (69.4)	194 (24.3)	51 (6.4)
Telepharmacy is more convenient to patients living in rural area	588 (73.5)	159 (19.9)	53 (6.6)
Telepharmacy services allow prompt patients interventions	508 (63.5)	222 (27.8)	70 (8.8)
Telepharmacy services may enhance patients communication with their healthcare providers	575 (71.9)	183 (22.9)	42 (5.3)

Table 3 Participants' Perceived Concerns About Telepharmacy (N= 800)

Statements	Participant' Responses n (%)		
	Strongly Agree/ Agree	Neutral	Strongly Disagree/ Disagree
Telepharmacy services require a lot of mental effort by the patients and the pharmacists	465 (58.1)	218 (27.3)	117 (14.6)
Telepharmacy may threatens information confidentiality and patients' privacy	382 (47.8)	270 (33.8)	148 (18.5)
Telepharmacy may contribute to communication errors between the patient and pharmacist	464 (58.0)	223 (27.9)	113 (14.1)
Patients might be unable to build a professional relationship with pharmacist using telepharmacy service	444 (55.5)	251 (31.4)	105 (13.1)
Telepharmacy may contribute to medication dispensing errors due to the nature of virtual interaction	455 (56.9)	235 (29.4)	110 (13.8)
Telepharmacy reduce the social and empathic aspects of care	422 (52.8)	263 (32.9)	115 (14.4)
Telepharmacy is associated with excessive cost of transporting medication	423 (52.9)	267 (33.4)	110 (13.8)

The study showed that an appreciable percentage of the Jordanian population had never heard about telepharmacy, and most of them never used it. These findings are expected as telepharmacy is one of the eHealth services not yet implemented in Jordan. Nevertheless, the study revealed that Jordanians have favorable views regarding the potential benefits of telepharmacy, particularly effort and time savings. These positive views are consistent with studies on telepharmacy^{24,25} and telemedicine in general.^{19,26} Likewise, aligning with other studies on telepharmacy,^{27,28} the study showed that protecting patients during pandemics and convenience to patients living in remote areas are other vital perceived benefits in favor of telepharmacy.

Furthermore, the study revealed that Jordanian populations are willing to utilize telepharmacy, with strong motives for this service acceptance and adoption, providing them convenience and accessibility to multiple remote pharmaceutical care and medication-related services relevant to their health issues. In particular, remote patient counseling, remote home

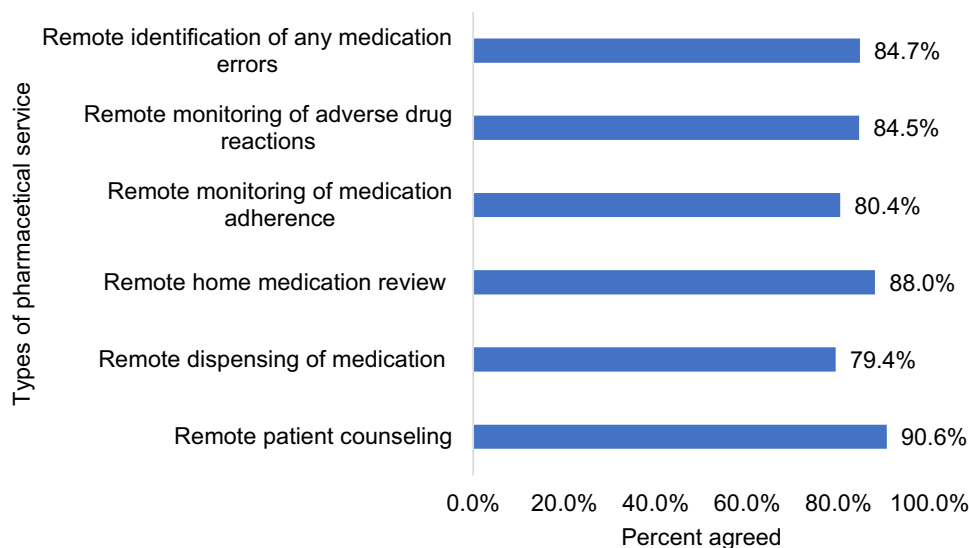


Figure 2 Types of pharmaceutical services participants willing to us (n= 490).

Table 4 Assessment of Factors Associated with Participants' Willingness to Use Telepharmacy Service

Parameter	Dependent Variable: Willingness to Use Telepharmacy Services [0: No/I Do not Know, 1: Yes]			
	OR	P-value [#]	OR	P-value [§]
Age (years)	1.013	0.057 [^]	0.997	0.760
Gender				
o Female	Reference			
o Male	1.983	<0.001 [^]	1.947	<0.001 [*]
Educational level				
o University students or below	Reference		–	–
o University graduate or above	0.982	0.899		
Marital status				
o Married	Reference			
o Others (Single, divorced, or widowed)	0.890	0.426	–	–
Do you have children?				
o No	Reference			
o Yes	1.305	0.067 [^]	1.149	0.484
Monthly income				
o ≤800 JD/month	Reference			
o >800 JD/month	1.248	0.460	–	–
Place of residence				
o Center of Jordan	Reference			
o Others (north or south of Jordan)	2.014	<0.001 [^]	2.168	<0.001 [*]
Do you have biomedical-related degree?				
o No	Reference			
o Yes	1.408	0.023 [^]	1.246	0.191
Do you suffer from chronic diseases?				
o No	Reference			
o Yes	1.967	0.001 [^]	1.534	0.064
Frequency of visiting a community pharmacy per month				
o 0–1 time/month	Reference			
o ≥2 times/month	1.023	0.878	–	–

Notes: [#]Using simple logistic regression, [§]Using multiple logistic regression, [^]Eligible for entry in multiple linear regression, ^{*}Significant at 0.05 significance level.

Abbreviations: OR, Odd ratio; JD, Jordanian Dinar.

medication review, and remote identification of medication errors. Similar results have been reported in various contexts, indicating the patients' desire to use telepharmacy services.^{29,30}

Identifying sociodemographic predictors of the willingness to telepharmacy service utilization has important implications for its implementation in the country. Among the ten predictors investigated in this study, the findings from the logistic regression analysis conducted revealed a significant impact of gender, as well as geographic location, on the willingness of the Jordanians to use telepharmacy. Explicitly, males were significantly more willing to use telepharmacy than females, and participants residing in remote areas (in the north and south) of Jordan were significantly more willing to use the service than those in the central region.

Previous research on gender differences in telehealth and telepharmacy use has shown conflicting results, with some studies suggesting that women are more accepting, others proposing that men are more accepting, and others showing no difference in the utilization level.^{31–34} Various factors, such as differences in eHealth literacy, health-seeking habits, attitudes toward technology, and convenience preferences, may impact this gender disparity.³⁵ Further research is

required to understand the underlying causes of these gender differences in Jordanians' telepharmacy usage willingness and to provide focused interventions that address potential hurdles unique to each gender.

The greater willingness to use telepharmacy seen in the north and south areas of Jordan reflects a more robust understanding of the potential benefits offered by telepharmacy in addressing accessibility difficulties among rural area residents. This finding is consistent with other studies showing that telemedicine and telepharmacy could be crucial in bridging healthcare disparities in distant places.^{36,37}

Although the study's regression model explained variance of participants' willingness to use telepharmacy is relatively low (8.4%), its classification accuracy of (65.1%) entails that it can help identify individuals who are more likely to be willing to use telepharmacy services (Nagelkerke R^2). Of note, willingness to use telepharmacy is a multifactorial behavior that can be influenced by various individual, cultural, and contextual factors.^{37,38} In this regard, future research is immanent to identify the other predictors beyond those included in the study and adequately capture the numerous aspects impacting willingness to use telepharmacy in Jordan.

Although Jordanians in this study showed a positive perception and high willingness to use telepharmacy, successfully implementing this service requires addressing their concerns about adopting telepharmacy. This study revealed the most commonly identified Jordanians' perceived worries related to the acceptance and adoption of telepharmacy, including the mental effort needed, possible communication and medication errors, and the inability to build professional relationships with pharmacists with virtual interactions during the service delivery. These concerns about using telepharmacy are varied from those reported by the study that investigated the adoption and usage of telemedicine among Jordanians, concluding that privacy, medical errors, and capacity for accurate diagnosis were the most prevalent.¹⁹ This variability can be attributed to the specific nature and context of telepharmacy compared to telemedicine and the subsequent differences in both studies' questionnaire designs.

In light of the study findings, the potential perceived benefits and the high willingness to use telepharmacy among the general population in Jordan, besides identifying gender and geographical location as predictors of their willingness to use the service, provide vital initiatives for telepharmacy implementation in Jordan. Furthermore, mitigation of the identified public concerns regarding telepharmacy acceptance and adoption is necessary to pave the way for this service use and optimization. Collaboration between policymakers, healthcare professionals, and technical telepharmacy providers is essential to build the capacity for telepharmacy adoption in Jordan. Successful implementation relies on addressing these challenges while leveraging the advantages of remote healthcare services.

The study has a few limitations, as the convenient sampling design limits the generalizability of the study results. While the applied logistic regression analysis provided valuable insights, the analysis did not include other potential influencing factors such as eHealth literacy, health-seeking habits, and attitudes toward technology among the Jordanian population. Despite these few limitations, the study is the first to assess the use of telepharmacy and investigate the socioeconomic disparities related to willingness to use the service among Jordanians. Additionally, it identified their worries that may pose potential barriers to telepharmacy adoption.

Conclusion

The findings of this study demonstrate a positive perception and high willingness to use telepharmacy among the general population in Jordan. However, to ensure widespread acceptance and adoption of telepharmacy, concerns related to the mental effort needed, possible communication and medication errors, and the inability to build professional relationships with pharmacists due to the lack of physical interaction during telepharmacy delivery should be mitigated. By doing so, telepharmacy can potentially enhance access to pharmaceutical care services, especially for patients residing in distant areas of Jordan, offering convenience and cost saving. Subsequent research should address study limitations and incorporate a wide range of influential factors for a comprehensive understanding of telepharmacy adoption among the general population in Jordan.

Disclosure

The authors report no conflicts of interest in this work.

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