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ORIGINAL RESEARCH

Acceptability and Willingness of UAE Residents to Use OTC Vending Machines to Deliver Self-Testing Kits for COVID-19 and the Implications

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Purpose: Self-testing kits for SARS-CoV-2 appear effective, practical, safe and reliable as well as helping patients with mild-to-moderate symptoms to be successfully managed at home without going to hospital. As a result, ease pressures on hospitals. OTC vending machines offer the potential for SARS-CoV-2 self-testing kits alongside making available OTC treatments to alleviate the symptoms of COVID-19. As a result, providing confidentiality alongside ease of use in case people do not want their status broad casted. Consequently, there was a need to assess the acceptability and willingness regarding the availability of OTC vending machines to dispense self-testing kits for SARS-CoV-2 among UAE residents to provide future direction.

Patients and Methods: A cross-sectional survey using a designed questionnaire was based on previous research and expert input and pilot tested. All items in the final questionnaire were seen as acceptable with a satisfactory content validity. A purposive sampling strategy was used in the principal study by primarily sending a link to the questionnaire to UAE universities via Facebook and WhatsApp.

Results: A total of 876 respondents participated in the study and completed the whole questionnaire. Most participants were female (63%), Arabic origin (42%) and holding a bachelor's degree (84.5%). There was high acceptability and willingness to use self-testing kits (87.2%), with 88.6% of respondents believing OTC vending machines would be beneficial for patients with actual or suspected SARS-CoV-2. Gender, nationality, educational level, employment status, having relatives infected with SARS-CoV-2 and being vaccinated were significantly associated with attitudes towards the self-testing kits. Recognised barriers include their potential costs, ease of access and help for those who cannot read the instructions.

Conclusion: Overall, there was high acceptability and willingness to use OTC vending machines to deliver self-testing kits for SARS-CoV-2 among the surveyed participants. Key barriers will need to be addressed to enhance their use.

Keywords: SARS-CoV-2, self-testing kits, attitudes, public acceptability and willingness, UAE

Introduction

The coronavirus disease (COVID-19) caused by the newly identified severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has impacted globally on morbidity and mortality since the virus was first reported in Wuhan, China, in December 2019.[1] By late March 2020, there were over 527 million confirmed cases with over 6 million deaths.[2] Initially, there were no effective treatments for patients with COVID-19; however, there were claims for repurposed treatments including hydroxychloroquine and

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some antiviral medicines, including remdesivir, until proven otherwise.[3–7] Consequently, the principal activities to stop the spread of the virus among countries, with its subsequent impact on morbidity and mortality, included contact tracing and quarantining, social distancing and lockdown measures, as well as the closure of borders and educational establishments and restricting movements generally including mass gatherings.[8–13] These measures had appreciable economic consequences for governments and families, resulting in an urgency to rapidly isolate and quarantine cases.[8,11,14–16] The initial measures also necessitated governments to rapidly enhance their testing capacities, especially among low- and middle-income countries (LMICs), until reliable self-testing could be instigated.[8,9,17,18] However, there were concerns with the ability of LMICs to rapidly scale up the detection of SARS-CoV-2 using real-time reverse transcription polymerase chain reaction (RT-PCR) testing with often few fully equipped laboratories in the early stages of the pandemic, available resources to purchase reagents as well as potential stock-outs of reagents.[19–21] In addition, concerns among the public, especially in LMICs, about accessing RT-PCR testing facilities, especially if this involves interacting with patients with COVID-19, potentially travelling long distances to access testing sites with associated time and cost implications and conflicts with work schedules, as well as a lack of privacy.[22–24]

The concept of self-testing with rapid, lateral flow, SARS-CoV-2 antigen detection tests (RADT) helps to address these concerns,[13,19,22–24] building on existing strategies for patients with diabetes as well as those with HIV, hepatitis C, malaria, and syphilis, testing themselves at home.[13,19,25–30] The benefits of self-testing at home included greater uptake, ability to test at scale, efficiency with for instance no additional staff and personal protective equipment (PPE) involved, increased privacy reducing the potential for possible stigma, lack of contact with possible patients with COVID-19 in healthcare facilities as well as convenience.[21,25,31–34]

Published studies have demonstrated that RADTs correctly rule out infections with SARS-CoV-2 in up to 99.5% of the people with symptoms and 98.9% of the people without symptoms.[31,35] As a result, meeting World Health Organization (WHO) minimum criteria for product selection.[36] Overall, RADTs have proven to be acceptable among users, safe among the general populations and reliable enhancing their use.[22,23,34] Such tests also keep patients with suspected COVID-19, as well as those with mild or moderate symptoms, successfully managed at home without the need to go to hospital, thereby easing pressures on hospitals and saving costs.[37] However, there have been concerns with their diagnostic accuracy, especially false positives, potentially impacting on their use in practice.[38,39] As a result, the WHO issued updated guidance in March 2022 surrounding RADTs with minimum criteria of 80% sensitivity and 97% specificity,[40] which are seen as particularly important in LMICs with limited laboratory facilities.

RADTs are now available in community pharmacies and retail settings in an appreciable number of countries,[38,40] and they can also be purchased via the internet.[19,22,38,40,41] They are also now available through vending machines in some countries including the United Arab Emirates (UAE).[42] Vending machines dispensing healthcare products, including over-the-counter (OTC) medicines, are gaining in popularity across countries.[43,44] This is because they make medicines, including paracetamol, ibuprofen, aspirin and indigestion treatments, readily available to the public. In addition, vending machines are typically simple to operate and represent a viable method of distributing pertinent healthcare products to the public. We know in other disease areas, including delivering reliable and sensitive self-testing kits for HIV, that testing kits delivered through vending machines are seen as credible, confidential, and convenient.[45] However, there can be concerns if low levels of literacy exist when patients purchase self-testing kits via vending machines and not through outlets such as community pharmacists with personnel available to provide advice.[19]

Consequently, we wanted to assess the acceptability and willingness of UAE residents regarding the availability of self-testing kits for SARS-CoV-2 via vending machines. This builds on existing published studies documenting current preferences for RADTs among the population.[19,21–23] The findings can be used to help guide future policy in this area in UAE and wider building on existing published studies.

Materials and Methods

Study Settings and Design and Instrument

An online descriptive cross-sectional survey methodology was adopted for this study.

Research Instrument Development

The research questionnaire was based on previous research that looked at people's knowledge of, and views, regarding SARS-CoV-2 and COVID-19.[46–49] Following this, we created a self-administered questionnaire in English based on pre-existing surveys in which the major elements of the issues in question were integrated and the questionnaire modified to meet the UAE setting. Experts in the field were requested to analyze and appraise the questionnaire's design, substance, and relevance, as well as its legibility and fluency. The questionnaire was subsequently validated by seven pharmacy academics from Ajman University, UAE. Following their input, the questionnaire was slightly adjusted. The created survey instrument was subsequently administered via email to 25 participants conveniently selected as a pilot before being fully deployed on the research population. We used this methodology as we were unaware of any published questionnaires at the time including those used in Brazil, Indonesia and Nigeria.[19,21–23] However, the findings from recently published studies will be used to place the general findings from this research in context apart from those specifically aimed at the availability and use of vending machines.

For each item assessed during the pilot phase, Lawshe's content validity ratio (CVR) was used to measure the questionnaire's quantitative content validity.[50] All items with a minimum score of 0.78 were deemed acceptable, and those that did not meet the 0.78 standard were eliminated from the final questionnaire.[50] The content-validity index was subsequently constructed using the mean CVR value of the kept items (CVI). The final validity of the questionnaire was determined to be satisfactory with a CVI of 0.85.[51]

The dependability of the final administered questionnaire was ensured by making changes based on the findings of the pilot study. Examples included defining the scientific terminology, modifying the numbering of the questions and pages, replacing the field name (Sex) with (Gender) throughout the questionnaire, linking some questions to each other, and ending the questionnaire at certain answers. Since no major concerns were identified regarding the survey instrument during the pilot research, it was subsequently employed in the principal study following minor changes. The results of the pilot research were excluded from the final analysis. Cronbach's alpha was calculated to guarantee the questionnaire's reliability; the -value of 0.78 indicated that the internal consistency was satisfactory.

Research Instrument Sections

The study instrument tested participants' understanding, attitudes, and perceptions regarding the acceptability of and willingness to utilize OTC vending machine to deliver self-testing kits for SARS-CoV-2 as opposed to purchasing them directly from a community or hospital pharmacy. The survey was split into two sections. The participants' demographic information was collated in the first section (age, gender, education, employment, and vaccination status). The respondents' attitudes on the appropriateness of, and inclination to utilize, an OTC vending machine to supply self-testing kits for SARS-CoV-2 were assessed in the second phase. The respondents' perceptions concerning the usage of OTC vending machines to offer self-testing kits for SARS-CoV-2 were assessed using categorical responses: (agree/disagree). We only included these two responses to gain a clear understanding of current attitudes following the advice of the review panel. A positive attitude response received one point, whereas a negative attitude response received zero points. Each respondent's perception and attitude scores were determined by adding the grades for the right replies (Appendix 1).

The responses were gathered between June and October 2021. During which time, 876 individuals from UAE had completed the validated web-based questionnaire posted on their personal or general Facebook and WhatsApp social media platforms.

Study Population (Inclusion and Exclusion Criteria)

National and UAE resident adults aged 18 and over who were willing to engage in the study were included in the population of the study. Those who were under the age of 18 at the time of the study or did not want to take part were excluded from the research.

Sample Size and Sampling Technique

We found no data or results in the existing literature suggesting the extent to which the public were aware of these topics at the time of administering the questionnaire, including any publications regarding their availability via vending machines. Consequently, a pilot research study was conducted to determine an appropriate sample size for the final survey as well as enhance the robustness of the final questionnaire. The sample size for the main study was calculated using the pilot respondents' responses to the question "Are you willing to use an OTC vending machine to deliver COVID-19 self-

testing kits?" to which around half of the respondents (50%) said "yes." The chosen alpha level of 5% resulted in a confidence interval (CI) of 95%. The 95% CI's precision (D) was set to 5%, resulting in a maximum width of 10% for the 95% CI. Assuming a 60% non-response rate, a sample size of 960 individuals was deemed adequate. The authors utilized a purposive sample strategy without a pre-determined sample size to recruit participants via Facebook and WhatsApp primarily through a link sent to all universities throughout UAE. This approach was used to rapidly approach people, with these social networking connections asked to complete the questionnaire before sharing it with members of their network.

Statistical Analysis

Statistical analyses were undertaken using Version 24 of the Statistical Package for the Social Sciences software (SPSS; IBM Corp., Armonk, NY, USA). The quantitative categorical data were reported as percentages and frequencies, with the continuous, normally distributed quantitative variables presented as means and standard deviations (SD). Unpaired Student's t-tests, one-way ANOVA, and non-parametric variants were used to evaluate the difference in quantitative variables across groups. The normality was assessed by conducting the Shapiro–Wilk test (with p value less than 0.05 confirming the normality of continuous variable) or by visual assessment of the Normal Q-Q Plot.

Finally, multivariate linear regression models were used to examine the factors influencing respondents' attitudes and perceptions about the acceptability of, and willingness to utilize, OTC vending machines to provide self-testing kits for SARS-CoV-2. Variable selection and model construction were undertaken using the stepwise technique. A p-value of less than 0.05 was used as the criterion for determining statistical significance.

Ethical Considerations

This study was authorized by AU's Institutional Ethical Review Committee (P-H-S-2021-2-21). The study complies with the Declaration of Helsinki. Everyone who took part in the survey did so of their own free will. The goal of the research was stated on the questionnaire's cover page, and respondents who continued to the next page were deemed to have granted their consent. The identities of respondents were not documented in any way, and they were guaranteed anonymity.

Results

Demographic Characteristics of the Study Participants

Table 1 displays the results of demographic characteristics of the study participants. A total of 876 respondents participated in the study and completed the whole questionnaire giving a response rate of 91.3% (876/960). The average age of the respondents was 31 years ± 6.5 SD.

Of the total participants, 37% (n=324) were male and 63% (n=552) were female. The nationality amongst the study participants were 88 (10%) Emirati, 368 (42%) Arabic, 252 (28.8%) Western, 92 (10.5%) Asian and 76 (8.7%) African. The majority of the study participants (84.5%) were Bachelor degree education holders. Moreover, 53.9% (n=472) of the participants were currently unemployed and 46.1% (n=404) were employed reflecting the dissemination strategy among universities in the UAE. Among the participants, 40.6% had relatives infected with COVID-19, 63.5% of the participants had been infected with SARS-CoV-2 and 55.7% were vaccinated against the COVID-19 virus.

Attitude and Perception Towards Acceptability of and Willingness to Use OTC Vending Machine to Deliver COVID-19 Self-Testing Kits

In general, an appreciable number of the participants had a favourable attitude towards the acceptability of, and willingness to use, OTC vending machine to deliver self-testing kits for SARS-CoV-2. The average attitude score on acceptability of, and willingness to use, OTC vending machine to deliver self-testing kits for SARS-CoV-2 was 87.2% with a 95% confidence interval (CI) [86.1%, 88.2%]. Out of the total number of participants, 88.6% believed that OTC vending machine delivering self-testing kits would be beneficial for patients with suspected or confirmed COVID-19. Moreover, 95.4% were willing to use OTC vending machine to obtain self-testing kits as opposed to visiting community or hospital pharmacies to obtain these.

Table 2 shows the results of each question related to attitude and perception regarding the acceptability of, and willingness to use, OTC vending machines to deliver self-testing kits for SARS-CoV-2.

Table 1 Number and Percentages of the Questions on Demographics (n=876)

Demographics	Groups	Frequency	%
Age (mean ± SD)	31 ± 6.5		
Gender	Male	324	37
	Female	552	63
Nationality	Emirati	88	10
	Arabic	368	42
	Western	252	28.8
	Asian	92	10.5
	African	76	8.7
Education	Bachelor	740	84.5
	Postgraduate	136	15.5
Employment status	Unemployed	472	53.9
	Employed	404	46.1
Have any of your relatives been infected with COVID-19?	Yes	356	40.6
	No	520	59.4
Have you ever been infected with COVID-19?	Yes	556	63.5
	No	320	36.5
Have you been vaccinated against COVID-19 virus?	Yes	488	55.7
	No	388	44.3

Table 2 Number and Percentage of Questions Regarding Participants' Attitude

Attitude Items	Agree		Disagree	
	N	%	N	%
Using OTC vending machine to deliver COVID-19 self-testing kits is accessible 24/7	628	71.7	248	28.3
Using OTC vending machine to deliver COVID-19 self-testing kits help promote precautionary and preventive measures for COVID-19	784	89.5	92	10.5
OTC vending machine can provide other medicines needed to treat the symptoms of COVID-19	628	71.7	248	28.3
OTC vending machines will be conveniently located (in proximity to me)	708	80.8	168	19.2
Using OTC vending machine to deliver COVID-19 self-testing kits provides a guaranteed confidentiality	556	63.5	320	36.5
Using OTC vending machine to deliver COVID-19 self-testing kits provide a quick service, no need to wait in line (Accessibility and Convenience)	748	85.4	128	14.6
Compared to PCR test, using OTC vending machines to deliver COVID-19 self-testing provides lower costs	624	71.2	252	28.8
Do you believe OTC vending machine to deliver COVID-19 self-testing kits will be beneficial for patients with suspected or confirmed COVID-19?	776	88.6	100	11.4
Will you personally use OTC vending machine to deliver COVID-19 self-testing kits?	836	95.4	40	4.6

Abbreviations: F, frequency; %, percentage.

Table 3 shows the attitude and perception scores according to participant demographics. Among the variables, gender (P=0.008), nationality (P=0.001), educational level (P=0.004), employment status (P<0.001), having relatives who have been infected with the COVID-19 (P<0.001), being infected with COVID-19 (P<0.001) and being vaccinated against the COVID-19 virus (P<0.001) had a statistically significant association with attitudes regarding the acceptability of, and willingness to use, self-testing kits for SARS-CoV-2.

The results of the stepwise procedure applied to a linear regression model showed that being infected with COVID-19 (β = 0.667, P < 0.001), being vaccinated against COVID-19 (β = 0.536, P < 0.001), female gender (β = 0.235, P=0.001), having relatives who have been infected with COVID-19 (β = 0.190, P=0.039), employees (β = 0.480, P < 0.001) and older participants (β = 0.047, P < 0.001) are jointly highly associated with a positive attitude and

Table 3 Attitude Score According to Demographics

Demographic Variables	Attitude and Perception Score			
	Mean ± SD		Median	P-value
Gender				
Male	7.67	1.55	7.3	0.008*
Female	7.94	1.30	8	
Nationality				
Emirati	7.54	1.56	7.12	0.001*
Arabic	7.81	1.40	7.72	
Western	7.92	1.37	8	
Asian	8.30	1.16	9	
African	7.52	1.50	7.11	
Education				
Bachelor	7.90	1.28	8	0.004*
Postgraduate	7.52	1.92	7.5	
Employment status				
Unemployed	7.57	1.54	8	<0.001*
Employed	8.15	1.15	9	
Have any of your relatives been infected with COVID-19?				
Yes	7.67	1.49	8	<0.001*
No	8.08	1.24	7.4	
Have you ever been infected with COVID-19?				
Yes	7.23	1.61	9	<0.001*
No	8.19	1.13	8	
Have you been vaccinated against COVID-19 virus?				
Yes	7.49	1.52	9	<0.001*
No	8.12	1.24	8	

Notes: *P-values less than 0.05 were considered statistically significant, P-values obtained from the Kruskal–Wallis and Mann–Whitney *U*-tests.

Table 4 Multivariate Regression Analysis for the Factors Affecting the Using Attitude on Using OTC Vending Machine to Deliver COVID-19 Self-Testing Kits

Factors	Attitude and Perception Score			
	B	95% CI		P-value
Being infected with COVID-19	0.667	0.483	0.851	<0.001*
Received COVID-19 vaccine	0.536	0.362	0.711	<0.001*
Female gender	0.235	0.053	0.417	0.001*
Western nationality	−0.282	−0.488	−0.075	0.008*
Have relatives who were infected with COVID-19	0.190	0.010	0.370	0.039*
African nationality	−0.925	−1.327	−0.522	<0.001*
Postgraduate education	−0.358	−0.592	−0.124	0.003*
Employees	0.480	0.304	0.655	<0.001*
Age	0.047	0.030	0.063	<0.001*

Note: *P-values less than 0.05 were considered statistically significant.
Abbreviations: B, un-standardized coefficients; CI, confidence interval.

perception regarding the acceptability of, and willingness to use, an OTC vending machine to obtain COVID-19 self-testing kits.

On the other hand, Western participants (β =−0.282, P = 0.008), African participants (β = −0.925, P < 0.001) and Postgraduates (β = −0.358, P = 0.001) were less likely to believe in the acceptability of, and willingness to use, OTC vending machine to obtain COVID-19 self-testing kits (Table 4).

Discussion

The high acceptability and willingness to obtain and use self-testing kits for SARS-CoV-2 dispensed from vending machines, particularly as a means of promoting precautionary and preventative measures to limit the spread of COVID-19,[9–12] seen in this study is similar to findings in Nigeria where the public perceived multiple benefits from self-testing kits,[19] Brazil where over half of the surveyed population would use self-testing kits if available, Cyprus and Greece at 79% of the population surveyed, Indonesia with over 60% of the population willing to use self-testing kits, and in the USA where 82.8% were motivated to order self-testing kits online.[22,23,52,53] Their acceptability will be helped by being conveniently located for citizens within UAE, limiting the need to wait in line to purchase the kits in pharmacies. In addition, providing other OTC medicines that can help with symptomatic relief of COVID-19 as well as offering guaranteed confidentiality. Alongside this, if their supply well regulated reducing the potential for counterfeit kits which is a concern in some countries.[21] There were also no real concerns regarding the potential for false-positives and false-negatives unlike the situation in other studies in Greece.[38] Consequently, it was not surprising that an appreciable number of participants in this study believed that the availability of self-testing kits in OTC vending machines in UAE would be beneficial for patients with suspected or confirmed COVID-19 and they would personally use such facilities.

Interestingly, favourable attitudes towards OTC kits were enhanced by either being infected with COVID-19, having relatives infected with COVID-19 or being vaccinated against COVID-19. In addition, either being an employee, older or female gender. Being employed, having completed education above primary school and living in a rural area enhanced the likelihood of using self-testing kits in Indonesia, with similar findings regarding education and employment in other countries.[22,23,52,53] Concerns regarding low literacy was also important regarding their use in Nigeria.[19]

The introduction of OTC vending machines should also help ensure that self-test kits reach the population promptly, which will allow UAE to undertake increased testing with successive waves of the pandemic. This is similar to the

situation in Singapore with self-testing seen as a key way to emerge from endemic living,[54] as well as among university personnel in the USA.[55,56]

However, the use of these machines is characterized by a number of barriers and challenges that have threatened their success in countries including potentially the UAE. Similar to HIV, one of the prominent barriers is a potential stigma associated with using OTC kits, which was also seen in the case of HIV testing kits alongside issues of homophobia.[45] The potential stigma surrounding COVID-19 could well impede the acceptability and willingness of residents to embrace the technology, which would be a severe threat to the acceptability of vending machines. However, the anonymity surrounding OTC vending machines may help address this concern. Poor access within a country with respect to OTC vending machines will also impede their adoption. However, according to Tan and Cook (2021), easy access to testing for COVID-19 has saved time and money as well as encouraged social responsibility.[54] This is particularly important in more rural areas within a country where access to physicians and pharmacists may be more limited. Similarly in the US, the availability of OTC vending machines, alongside facilities that can rapidly analyse the results, has provided rapid tracking of university personnel with possible COVID-19 to help control the spread providing direction for the future.[55,56]

Another recognized barrier is that OTC vending machines are becoming increasingly costly and may expose the government to higher healthcare costs depending on how the costs of these machines are being handled. While the test kits could potentially be accessed at lower costs, the machines may though need educational knowledge to operate successfully.[42] This means that people struggling to read the instructions will need additional professional assistance to use the technology. Public education is also important where there are concerns with the reliability of self-testing kits, especially those that meet current WHO requirements for sensitivity and specificity, and where there are concerns with inappropriate activities based on test findings.[13,38–40] Alongside this, supply chain and demand unpredictability have also emerged as a significant challenge for OTC vending machines to successfully deliver self-testing kits for COVID-19. Having said this, the pandemic itself has disrupted the global supply chain including the raw materials needed for manufacturing diagnostics and technology.[57–60]

Similar to other countries, the UAE has been a victim of disrupted supply chains, which could also impede the use of the OTC vending machines, especially if any country has to source their kits overseas. UAE health authorities need to consider these issues along with other potential barriers, including possible higher costs, stigmatization, literacy levels and reliability, to enhance the use of OTC testing kits. By successfully addressing these concerns, the health authority can introduce an effective and efficient approach to improving accessibility to OTC testing kits with high sensitivity and specificity, building on the willingness of the citizens in the UAE to generally embrace OTC technology.

Alongside this, health officials will need to generally introduce and encourage community-based healthcare, especially with an increase in non-communicable diseases (NCDs) such as diabetes caused by the pandemic, with existing concerns generally with treating NCDs in the UAE and across the Gulf States.[61–64] The need for community-based testing will necessarily grow as the current pandemic moves towards an endemic status. Potential initiatives could include campaigns and outreach activities to target people within smaller community settings, informing them about the benefits of rapid testing alongside generally improving their lifestyles. Such campaigns can encourage the population to embrace and use the OTC vending machines as a primary COVID-19 management strategy, and reduce possible stigma associated with COVID-19 and possible resistance in seeking care.[19] However, this is likely to need extensive education, including communication of any high sensitivity and specificity in lay language as well as instructions for use and the implications, along with subsidization of the prices of the test kits to address current and potential barriers. According to the Centers for Medicare & Medicaid Services and the Center for Disease Control and Prevention (2022), there is a need for these test kits to be free to encourage people to embrace the technology.[65–68] Similar findings regarding the need for low costs, or free kits, to enhance the uptake of self-testing have also been seen in other countries.[19,22] Healthcare professionals can also ask the government to increase its partnership with the private sector.[69]

Finally, the health authorities should also design and implement comprehensive models, surveillance, and contract tracing, to identify the most vulnerable population to focus on with successive waves of the pandemic. Such comprehensive strategies would help ensure that the public receives testing kits for SARS-CoV-2 based on their vulnerability

while also targeting the whole population, which should be part of any OTC vending machine strategy to deliver self-testing kits for SARS-CoV-2.

We recognise that there are a number of limitations with this study. Firstly, it was not possible to draw strong conclusions on the relationships between the factors based solely on a cross-sectional survey, indicating that more research using longitudinal data is necessary. Secondly, as the methodology comprised an online self-reporting survey, memory and social acceptability biases may have been introduced. In addition, individuals who were less likely to have Internet access, eg, those from lower socioeconomic classes or older age groups, may have been overlooked, which is likely to have affected the results' generalizability. These concerns are exacerbated by the questionnaire link primarily sent to universities throughout the UAE. Thirdly, biases due to responses' social desirability, memory, and selection are known to occur in observational research such as this work. Fourthly, as the questionnaire used closed-ended answers, certain important viewpoints may not have been captured. However, despite these concerns, we believe our findings are robust providing direction to the health authorities in the UAE going forward.

Conclusions

Overall, there was perceived acceptability and willing to use OTC vending machines to deliver self-testing kits for SARS-CoV-2 among the surveyed UAE population. Consequently, the availability of self-testing kits for SARS-CoV-2 via OTC vending machines holds the potential to promote precautionary and preventive measures to limit the spread of COVID-19. However, there are barriers to address including the potential additional costs for self-testing kits as well as literacy barriers. The health authorities will need to develop initiatives and campaigns to raise the awareness about the benefits of rapid testing to enhance their use alongside addressing concerns with reading ability as well as potential concerns with the sensitivity and specificity of any OTC tests among some residents.

Data Sharing Statement

The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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