

Investigating intention to receive the COVID-19 vaccine and willingness to pay among the general public in Pakistan

Ali Hassan Gillani^{1*}, Wenjing Ji¹, Sumaira Omer¹, Sadia Bashir², Hafsa Arshad³, Jamshaid Akbar⁴, Kamran Bashir⁵, Huda Abbas⁶, Azzah Khadim Hussain⁷

¹Department of Pharmacy Administration and Clinical Pharmacy, School of Pharmacy, Xian Jiaotong University, Xian, China.

²Department of Pathology, Quaid-e-Azam Medical College, Bahawalpur, Pakistan.

³Department of Pharmacy, Quaid-i-Azam University, Islamabad, Pakistan.

⁴Department of Pharmacy, Superior University, Lahore, Pakistan.

⁵Department of Pharmacy, Shahida Islam College of Pharmacy, Shahida Islam Medical College, Lodhran, Pakistan.

⁶Department of Community Medicine, Quaid-e-Azam Medical College, Bahawalpur, Pakistan.

⁷Department of Pharmacy, University of Central Punjab, Lahore, Pakistan.

ARTICLE INFO

Received on: 15/10/2021

Accepted on: 24/02/2022

Available Online: 05/05/2022

Key words:

Acceptability, COVID-19 vaccine, general public, Pakistan.

ABSTRACT

The coronavirus (COVID-19) vaccine has become recently available, and to make vaccination campaigns successful, we should increase the acceptability of the COVID-19 vaccine within the public. Thus, this study has been conducted to provide insights into the factors affecting vaccine acceptance and pricing considerations. A both online and paper-based cross-sectional study was conducted from August 1 to August 30, 2020, among the general population of Pakistan. The health belief model (HBM) was used to assess predictors of the intent to receive the vaccine and the willingness to pay (WTP). Descriptive analysis was done, and a chi-squared test was used to assess the demographic association with HBM items. The majority (73.4%) showed a definite/probable intent to receive the vaccine, and marital status and education were significantly associated with getting the vaccine. WTP for a dose of the COVID-19 vaccine was highest for less than 1,000 Pakistani Rupees (PKR) and lowest for 10,001–20,000 PKR. This research indicates that the acceptability of the COVID-19 vaccine in the Pakistani community is satisfactory but the majority of the population want to spend less money to get immunized.

INTRODUCTION

The novel coronavirus (COVID-19) causes a disease which mainly impairs the respiratory system of a human being (Paules *et al.*, 2020; Wu and McGoogan, 2020). The disease was officially named COVID-19 by the World Health Organization (WHO, 2020a). In the beginning, the spread was confined to nearby neighboring countries of China with confirmed cases reported in Japan, Thailand, and South Korea till January 20, 2020. An initial report by the WHO (2020b) declared 282 confirmed cases

of COVID-19 in China and in its neighborhood. The infection continued to rise and spread to other parts of the globe, and the WHO named it an international public health crisis on January 30, 2020, and the situation turned grimmer on March 11, 2020, when COVID-19 was declared a pandemic (WHO Director General, 2020). The disease proliferated fast, and according to the WHO (2020b) reports, the disease had shown its presence in around 213 countries and territories with more than 14 million confirmed COVID-19 cases and over 1 million deaths worldwide. COVID-19 due to its lethal nature has paralyzed the healthcare system of not only developing countries but also developed countries. However, the situation is outrageous for countries with fragile healthcare systems (Hayat *et al.*, 2020).

At that time, there was no defined treatment/cure for the COVID-19 disease, and it was being managed symptomatically (Hayat *et al.*, 2020). Proper management to control the epidemic

*Corresponding Author

Ali Hassan Gillani, Department of Pharmacy Administration and Clinical Pharmacy, School of Pharmacy, Xian Jiaotong University, Xian, China.
E-mail: hassangillaniali@yahoo.com

is basically comprised of the enforcement of isolation, quarantine, and physical distancing. Numerous countries have adopted variable measures to cease the rapid spread of disease, but all the efforts to control the epidemic seemed to be in vain. An efficient vaccine against COVID-19 was urgently required to cut the load of mortality and morbidity associated with the COVID-19 infection (Zhu *et al.*, 2020). Regarding the desperate need for vaccination, there were 150 countries indulged in the race to produce a vaccine, and a few entered phase 2 clinical trials (WHO, 2020c; Zhu *et al.*, 2020). Some proceeded to phase 3 clinical trials (Salzberg, 2020). The success of the vaccine relies on the people's acceptability of immunization. In the past, even though the effective and safe vaccine was available, the acceptability among the population was low due to various factors (Bödeker *et al.*, 2014; Donaldson *et al.*, 2015; Mak *et al.*, 2015). In an online survey in France, it was reported that 26% of the surveyed population were reluctant to use the vaccine against COVID-19 even if it is available (COCONEL Group, 2020).

Pakistan falls in the category of low-middle-income countries having a number of residents exceeding 197 million. It has four provinces, namely, Sindh, Punjab, Khyber Pakhtunkhwa (KPK), and Baluchistan, and three territories, including Gilgit-Baltistan, Islamabad Capital Territory and Azad Jammu, and Kashmir (Nations Online, 2020). The first two confirmed cases of COVID-19 in Pakistan were reported on February 26, 2020, which was a sign of high alert (France24, 2020). The spread was slightly slow till March 14, 2020, and there were only 31 definite cases afterward, a dramatic boom was recorded, and the number of cases rose rapidly. By August 22, 2020, the confirmed cases in Pakistan had crossed a figure of 292,173 (Government of Pakistan, 2020). Immunization for polio eradication in Pakistan has already proven to be a challenge. There are only two countries left behind in the war against polio: Pakistan and Afghanistan (Dawn, 2020). The Pakistani government is taking the utmost measures to eliminate polio from Pakistan, but there are hurdles in the immunization process (Kabir and Afzal, 2016). The most significant ones are less acceptability by the parents due to spiritual beliefs and safety concerns (Hussain *et al.*, 2016; Khan and Ahmad, 2015). Recently a study conducted in Malaysia has used the health belief model (HBM) to predict the acceptability of a new vaccine and to estimate the factors hindering vaccine acceptance (Wong *et al.*, 2020), but more and more data is needed to estimate the success of vaccination and willingness to pay (WTP) that will decide the amount the public is going to pay for the vaccine. As the development of the vaccine is in the pipeline but its success depends on the people's behaviors of acceptance, checking the acceptability of the potential COVID-19 vaccine is needed. Thus, this study was designed to evaluate the public's acceptance of the vaccine using the HBM.

MATERIALS AND METHODS

Study setting

An online study was conducted from July 1, 2020, to July 30, 2020, targeting multiple cities, villages (in close vicinity to the cities) from three provinces (Punjab, Sindh, and KPK). We preferred online platforms to collect the data after considering the

fact that, in Pakistan, 76 million people have Internet access and 37 million people are actively using various social media platforms (Anjum, 2020), but due to low response rate and time limitation, we decided to conduct paper-based data collection from four cities of three provinces: Bahawalpur and Lahore from Punjab, Karachi from Sindh, and Peshawar from KPK. The paper-based data were collected from August 1 to August 30. The selection of these cities was due to the convenience of the data collectors. However, the fourth province could not be targeted due to the lack of data collectors there.

Study design and questionnaire

A quantitative, cross-sectional study was conducted using a modified version of a published questionnaire (Wong *et al.*, 2020). Before using the tool, we conducted an online and paper-based pilot study, and changes were made accordingly. Also, a few partial changes and adjustments were made in accordance with the real scenario of Pakistan. The questionnaire was developed according to the HBM theory. The HBM was developed in the 1950s by social psychologists in the United States Public Health Service to predict and explain the acceptance of preventative measures such as vaccines (Anjum, 2020; Janz and Becker, 1984). This theory is one of the most frequently used in health behavior research (Carpenter, 2010). In our study, the HBM theory assessed the acceptability of the COVID-19 vaccine for the following aspects: perceived susceptibility and severity, which was collectively called the perceived threat of the COVID-19 infection, perceived barriers, perceived benefits, belief, and self-efficacy. WTP is an approach to estimate the maximum amount that an individual is willing to allocate for vaccination, services, and health technologies. The decision to receive a vaccination depends on the willingness of the society to pay for increased health benefits (Wong *et al.*, 2020).

Demographics, including occupation, age, educational level, and household income, were collected in the first part of the data collection tool. Then, one question assessed knowledge about COVID-19, one recorded the response on testing for COVID-19, and one accumulated the data of the testing results. Eighteen questions were presented to explore the knowledge, attitudes, and beliefs toward the COVID-19 vaccine, and each measurement scale was reported using a five-point Likert scale. We asked the respondents to make a choice between the following responses: "strongly agree," "agree" (combined and scored 1), "unsure," "disagree," and "strongly disagree" (combined and scored 0). The expected price for a COVID-19 vaccine to the respondents was also measured. The outcome was considered positive if the participant said that they "probably would get" or "definitely would get" the COVID-19 vaccine once it has been approved.

Sampling and study procedures

The convenience sampling method was used for collecting data. Data collection was done both electronically and in paper-based format. Online data were collected by making an online questionnaire on Google Form. The link was copied and shared on multiple social media platforms like email, WeChat, WhatsApp, and Facebook. The participants were able to answer all

the questions by simply clicking on the link. The individuals were requested to fill out the questionnaire and share the link to as many as possible. The questionnaire took 5–7 minutes to complete, and all the data collected by the questionnaire was put into an electronic database. Paper-based data were collected with the help of trained data collectors from different cities of Pakistan. Interviews were conducted in different regions of the cities targeting houses from different geographical locations. The selection of the respondents was made based on the lottery method which was used in previous research studies (Gillani *et al.*, 2018, 2021). A brief introduction of the study was mentioned at the beginning of the online data page and paper. The interviewer further explained the objective to the interviewee briefly. Participants over 18 years old currently living in Pakistan were included in this study.

Training of data collectors

Six data collectors were designated to collect data simultaneously in three different provinces. A team of two data collectors collected data from each city in different provinces while the team in Punjab were assigned two cities. They were mostly comprised of the local pharmacy students. Prior training was given which involved the following aspects: (1) presenting a brief introduction of the study purpose to respondents, (2) selecting the candidate by employing the lottery method, (3) conducting face-to-face interviews, and (4) coping with respondents' lack of cooperation or other difficulties during the interview. The training was carried out for three days, with a demonstration given by the primary researcher. The trainees then conducted a pilot study in each of their respective districts and were observed for their interviewing skills.

Statistical analysis

Descriptive data were presented as percentages (frequencies). Fisher's exact and the chi-squared tests were used to compare categorical variables where a p value of ≤ 0.05 was considered statistically significant. All the psychological consciousness items were compared with the outcomes ("would definitely" or "would probably" get the COVID-19 vaccine). The data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 18.0 (SPSS Inc., Chicago, IL).

Ethical approval

This study was approved by the Ethics Committee for Medical Research of Xi'an Jiaotong University (Ethical Approval no. COV2020) and the Research Ethics Committee of the Pharmacy Department of the Superior University Lahore (PHR-73/20). Participation in this study was voluntary, prior verbal approval was obtained from the participants, and all the respondents were made aware of their right to leave the study at any time in the ethical approval statement. No personal identifying information was collected, and participants were asked to sign the paper-based questionnaire, and in the case of the online survey, the participants were advised to start it only after reading the statement.

RESULTS

In total, 1,607 individuals participated (including both paper-based and online). The response rate for the paper-based

study was 85.8% (1,340/1,560). Among these, 1,087 (67.6%) were male and 1,113 participated from urban areas, 51 (3.2%) had middle school or lower education, and 798 (49.7%) had completed their bachelor's degree. The complete demographic characteristics of the respondents are presented in Table 1.

Table 2 demonstrates the attitudes of the participants toward the COVID-19 vaccine. Most of them, 1,447 (90.0%), agreed with the statement that infected people can pass the infection to others, 1,393 (86.7%) were concerned about the transmission of COVID-19, and 1,241 (77.2%) strongly agreed or agreed that it is bad for their children to become infected with the COVID-19.

About 1,413 (87.9%) of the respondents had admitted (agree or strongly agree) that vaccination is a safer way to protect their health against COVID-19, and 1,353 (84.2%) individuals said that getting vaccinated is beneficial for preventing the COVID-19 infection. Nearly half of the respondents, 787 (49.0%), thought that the vaccine would be painful, 92.0% said that they want complete information about the vaccine prior to its use, and also 84.5% of

Table 1. Demographic characteristics of respondents ($n = 1,607$).

Demographic characteristics	N (%)
Age	
Gender	
Male	1,087 (67.6%)
Female	520 (32.4%)
Locality	
Rural	494 (30.7%)
Urban	1,113 (69.3%)
Education	
Middle school or lower	51 (3.2%)
High school or junior college	199 (12.4%)
Bachelor's degree	798 (49.7%)
Master's degree and above	559 (34.8%)
Household monthly income (PKR)	
<16,000	210 (13.1%)
16,001–30,000	357 (22.2%)
30,001–50,000	443 (27.6%)
>50,000	597 (37.1%)
There currently is no effective cure for COVID-19, but early symptomatic and supportive treatment can help most patients recover from the infection	
Yes	1,287 (80.1%)
No	188 (11.7%)
Unsure	132 (8.2%)
Have you ever had a COVID-19, screening test	
Yes	321 (20.0%)
No	1,250 (80.0%)
What is the results of COVID-19 screening	
Positive	59 (18.3%)
Negative	266 (81.7%)

Table 2. Percentage of respondents' responses to the statements of the proposed constructs.

Statements	Strongly agree/agree <i>n</i> (%)	Strongly disagree/disagree/ unsure <i>n</i> (%)
Perceived threat (susceptibility and severity)		
Do you worry that you may transmit COVID-19 once get infected	1,393 (86.7%)	214 (13.3%)
Do you agree that infected should realize they may transmit COVID-19 to others	1,447 (90.0%)	160 (10%)
Do you think it bad if you or your child got infected with COVID-19	1,241 (77.2%)	366 (22.8%)
Perceived benefits		
Do you agree that a COVID-19 vaccine would be a good way to prevent COVID-19 infection	1,413 (87.9%)	194 (12.1%)
Do you agree that getting yourself vaccinated against COVID-19 would be a good way to protect your health even this outbreak finishes	1,353 (84.2%)	254 (15.8%)
Perceived barriers		
Do you think that shot will be very painful	787 (49.0%)	820 (51.0%)
You need to know clearly about a COVID-19 vaccine before deciding to get it	1,479 (92.0%)	128 (8.0%)
You worry about the safety of a new vaccine	1,358 (84.5%)	249 (15.5%)
You worry about the safety of any vaccine	1,223 (76.1%)	384 (23.9%)
You worry about the effectiveness of a new vaccine	1,349 (83.9%)	258 (16.1%)
Do you agree that it is risky for pregnant women to receive vaccines	1,005 (62.5%)	602 (37.5%)
Belief		
Your family would probably think it is a good prevention way of getting a COVID-19 vaccine	1,384 (86.1%)	223 (13.9%)
Do you agree that everyone should get the COVID-19 vaccine once it will be approved	1,219 (75.9%)	388 (24.1%)
You often follow Physician/pharmacist suggestions	1,427 (88.8%)	178 (11.2%)
Self-efficacy		
You could find a clinic or doctor to get COVID-19 vaccine If you want	1,218 (75.8%)	389 (24.2%)
You could consult Physician/pharmacist or other professional personals if you want to know information about COVID-19 vaccine	1,434 (89.2%)	173 (10.8%)
Outcome variable	Probably would/definitely would get it	Probably would not/definitely would not get it
What is the likelihood that you would get the COVID-19 Vaccine during this pandemic if the vaccine is available currently?	1,179 (73.4%)	428 (26.6%)
What is the likelihood that you would get the COVID-19 Vaccine if you have to take the shot every year if the vaccine is made available?	1,193 (74.2%)	414 (25.8%)

the participants confessed that they worry about the safety of the new vaccine. Almost 1,005 (62.5%) respondents felt that receiving the COVID-19 vaccine could be perilous for pregnant females. Around 979 (83.0%) persons agreed that everyone should be vaccinated once the vaccine gets approved.

As displayed in Table 3, 1,179 (73.4%) participants of the study population said that they would (probably or definitely) get the COVID-19 vaccine. Moreover, the bivariate analysis indicated that marital status and education level were significantly associated with the outcome. Keeping the lowest score as a reference, all items including perceived threat, perceived benefits, belief, and self-efficacy were statistically and strongly associated with “probably” or “definitely” getting vaccinated in this current pandemic (Table 4).

Willingness to pay

The price options ranged from the minimum amount of 1,000 Pakistani Rupees (PKR) to the maximum option of no limit for price. As shown in Table 5, all the demographic factors (except for locality) including marital status, education level, gender, and monthly household income were strongly associated with the marginal WTP for the COVID-19 vaccine, which means most of the demographic factors served as affordability barriers to the COVID-19 vaccine.

DISCUSSION

The COVID-19 vaccine is available, and its success largely relies on the people's attitude and willingness to accept vaccination (Gillani *et al.*, 2021). This study aims to track the

Table 3. Bivariate associations of demographics with the outcome of “probably” or “definitely” would get the vaccine in the present pandemic.

Demographic characteristics	Definitely would get/probably would get COVID-19 vaccine <i>N</i> = 1,179, <i>n</i> (%)	Definitely would not get/unsure/probably would get COVID-19 vaccine <i>N</i> = 428, <i>n</i> (%)	<i>p</i>
Gender			
Male (1,087)	793 (72.9%)	294 (27.1%)	0.588
Female (520)	386 (74.2%)	134 (25.8%)	
Locality			
Rural (494)	350 (71.0%)	144 (29.0%)	0.128
Urban (1,113)	829 (74.5%)	284 (25.5%)	
Education			
Middle school or lower (51)	34 (66.6%)	17 (33.4%)	0.012
High school or junior college (199)	156 (78.4%)	43 (21.6%)	
Bachelor's degree (798)	603 (75.6%)	195 (24.4%)	
Master's degree and above (559)	386 (69.0%)	173 (31.0%)	
Household monthly income (PKR)			
<16,000 (210)	156 (74.3%)	54 (25.7%)	0.066
16,001–30,000 (357)	267 (74.8%)	90 (25.2%)	
30,001–50,000 (443)	340 (76.7%)	103 (23.3%)	
>50,000 (597)	416 (69.7%)	181 (30.3%)	
Have you ever had a COVID-19, screening test			
Yes (321)	257 (80.1%)	64 (19.9%)	0.000
No/uncertain (1,250)	891 (71.3%)	359 (28.7%)	
What is the results of COVID-19 screening			
Positive (59)	55 (93.2%)	4 (6.8%)	0.002
Negative (266)	201 (75.6%)	65 (24.4%)	

public perceptions towards a COVID-19 vaccine and WTP by using the HBM in the Pakistani community. The finding of our research suggests that 26.6% of the participants would refrain from being vaccinated once the vaccine is available. Our research results are similar to the recent study in which 26% of the participants disagreed with being vaccinated in France (Donaldson *et al.*, 2015) but not in accordance with the result in Australia in which merely 4.9% of individuals wanted to remain unvaccinated during the current pandemic (Gillani *et al.*, 2018).

The reasons for the low acceptance of the COVID-19 vaccine in our current study may include the following. Firstly, only 20.0% of the total participants had the COVID-19 screening test, which means a large proportion of the sample population was unaware of the fact of whether they suffered from COVID-19. A lack of screening may impact the perception and attitude toward receiving a vaccine because the participants may consider themselves healthy and may not think it is necessary to take the vaccine. However, 86.7% were worried about the likelihood of transmission of COVID-19 if they become infected. Therefore, educating the public about COVID-19 and motivating them to get COVID-19 screening are recommendable.

One more leading reason for vaccine rejection was safety concerns. The majority of the participants (84.5%) were worried about the safety of the vaccine. Earlier, safety concerns

were also observed as a barrier to polio vaccination in Pakistan (The Conversation, 2020). Polio eradication has not been successful in Pakistan because many people hold skeptical views regarding vaccine safety (The Conversation, 2020). People were also reluctant to receive the polio vaccine due to misconceptions, for example, that the polio vaccine can cause infertility (Dodd *et al.*, 2020). The Pakistani government is working to the best of its abilities to get rid of these false perceptions about the polio vaccines, but militant organizations such as Tehreek-e-Taliban Pakistan and Al-Qaeda are a major hurdle to the eradication of polio from Pakistan. The misconception of people about the polio vaccine, insecurity within the country, and the poor health system are the reasons for the failure of polio eradication campaigns in the region (Basharat and Shaikh, 2017). This may affect COVID-19 vaccination campaigns in the future as well. Also, the media plays a role in building perceptions about the vaccination as in the Republic of Congo. Since the first case appeared, misinformation has spread across traditional media and social media, called by the WHO an infodemic. After hearing about the poor quality of the vaccine and the false information conveyed by the mass media which has included rumors on using the vaccination for the purpose of the extermination of the black race, healthcare workers may have developed vaccine hesitancy, which can influence their decisions to get vaccinated and to promote the vaccine to their

Table 4. Bivariate associations of demographics with the outcome of “probably” or “definitely” would get the vaccine in the present pandemic.

Statements	Definitely would get/probably would get COVID-19 vaccine <i>N</i> = 1179	Definitely would not get/ unsure/probably would not get COVID-19 vaccine <i>N</i> = 428	<i>p</i>
	Strongly agree/agree <i>n</i> (%)		
Perceived threat (susceptibility and severity)			
Do you worry that you may transmit COVID-19 once get infected	1,057 (89.7%)	336 (78.5%)	0.000
Do you agree that infected should realize they may transmit COVID-19 to others	1,088 (92.3%)	359 (83.9%)	0.000
Do you think it bad if you or your child got infected with COVID-19	958 (81.3%)	283 (66.1%)	0.000
Perceived benefits			
Do you agree that a COVID-19 vaccine would be a good way to prevent COVID-19 infection	1,090 (92.5%)	323 (75.5%)	0.000
Do you agree that getting yourself vaccinated against COVID-19 would be a good way to protect your health even this outbreak finishes	1,067 (90.5%)	286 (66.8%)	0.000
Perceived barriers			
Do you think that shot will be very painful	603 (51.1%)	184 (43.0%)	0.004
You need to know clearly about a COVID-19 vaccine before deciding to get it	1,120 (95.0%)	359 (83.9%)	0.000
You worry about the safety of a new vaccine	1,030 (87.4%)	328 (76.6%)	0.000
You worry about the safety of any vaccine	943 (80.0%)	280 (65.4%)	0.000
You worry about the effectiveness of a new vaccine	1,038 (88.0%)	311 (72.7%)	0.000
Do you agree that it is risky for pregnant women to receive vaccines	757 (64.2%)	248 (57.9%)	0.022
Belief			
Your family would probably think it is a good prevention way of getting a COVID-19 vaccine	1,078 (91.4%)	306 (71.5%)	0.000
Do you agree that everyone should get the COVID-19 vaccine once it will be approved	979 (83.0%)	240 (56.1%)	0.000
You often follow Physician/pharmacist suggestions	1,083 (92.0%)	344 (80.4%)	0.000
Self-efficacy			
You could find a clinic or doctor to get COVID-19 vaccine If you want	943 (80.0%)	275 (64.3%)	0.000
You could consult Physician/pharmacist or other professional personals if you want to know information about COVID-19 vaccine	1,096 (93.0%)	338 (79.0%)	0.000

patients (Khan and Sahibzada, 2016). A recent study conducted in Malaysia found that efficacy, side effects, and safety were the major perceived barriers to the COVID-19 vaccination (Hussain *et al.*, 2016).

Additionally, religious beliefs in Muslim countries (Pakistan) also play an important role in immunization. As in our study, almost 95% of the participants stated that they would only get the vaccine if given sufficient information. Consistent with these results, a study performed in Malaysia found that more than half of the respondents were concerned about the formulation of the COVID-19 vaccine and predicted that the acceptance rate of the new vaccine could be low, which would be drastic for the future (Hussain *et al.*, 2016). Previously, in Pakistan, the refusal of the polio vaccine was also linked to religious beliefs because many believed that the polio vaccine contained haram (prohibited in Islam) material (The Conversation, 2020). If many Pakistanis forewent receiving the

COVID vaccine due to religious beliefs, then this would definitely jeopardize the health and recovery process.

Lastly, there was a strong relationship between the marginal WTP and demographic factors in our study, which means affordability barriers along with socioeconomic factors, namely, higher education levels, marital status, and higher-income groups, resulted in a lower WTP. These results of our study were dissimilar to those of the study performed in Malaysia in which no significant association between marginal WTP and socioeconomic factors was found (Hussain *et al.*, 2016), and the same is the case with Chinese results (Shah *et al.*, 2016; Zhang *et al.*, 2020; The World Bank, 2020). Pakistan is a low-middle-income country (Kabamba *et al.*, 2020), and many people cannot afford high healthcare expenditures. Therefore, incorporating the COVID-19 vaccine into the national immunization program would definitely increase the vaccine coverage, particularly in the lower-middle-income groups.

Table 5. Binomial association of factors associated with marginal WTP for the COVID-19 vaccine ($N = 1,607$).

Demographic characteristics	<1,000 PKR (6.06 USD) <i>n</i> (%)	1000–10000 (6.06–60.6 USD) <i>n</i> (%)	10001–20000 (60.6–121.2 USD) <i>n</i> (%)	No price limit <i>n</i> (%)	<i>p</i>
Gender					
Male (1,087)	712 (65.5%)	237 (21.8%)	50 (4.6%)	88 (8.1%)	0.001
Female (520)	300 (57.7%)	124 (23.8%)	24 (4.6%)	72 (13.8%)	
Locality					
Rural (498)	308 (62.3%)	106 (21.5%)	20 (4.0%)	60 (12.1%)	0.223
Urban (1,113)	704 (63.3%)	255 (22.9%)	54 (4.9%)	100 (9.0%)	
Education					
Middle school or lower (51)	39 (76.5%)	6 (11.8%)	2 (3.9%)	4 (7.8%)	0.000
High school or junior college (199)	158 (79.4%)	21 (10.6%)	8 (4.0%)	12 (6.0%)	
Bachelor's degree (798)	495 (62.0%)	183 (22.9%)	32 (4.0%)	88 (11.0%)	
Master's degree and above (559)	320 (57.2%)	151 (27.0%)	32 (5.7%)	56 (10.0%)	
Household monthly income (PKR)					
<16,000 (210)	168 (80.0%)	22 (10.5%)	8 (3.8%)	12 (5.7%)	0.000
16,001–30,000 (357)	244 (68.3%)	77 (21.6%)	12 (3.4%)	24 (6.7%)	
30,001–50,000 (443)	275 (62.1%)	122 (27.5%)	18 (4.1%)	28 (6.3%)	
>50,000 (597)	325 (54.4%)	140 (23.5%)	36 (6.0%)	96 (16.1%)	

CONCLUSION

Most participants intended to receive the COVID-19 vaccine. Important predictors of a definite/probable willingness to take the COVID-19 vaccine include high perceived benefits and belief and higher perceived susceptibility to infection. Therefore, interventions are required to impart the optimum knowledge to increase the uptake of the vaccine. Also, the main population is willing to pay less for the vaccine. This could best be optimized by subsidizing the vaccine by the government.

ACKNOWLEDGMENTS

The authors acknowledge all the participants for their contributions in this study.

AUTHORS' CONTRIBUTIONS

Ali Hassan Gillani and Wenjing Ji conceptualized the study. Ali Hassan Gillani, Sumaira Omer, Jamshaid Akbar, Kamran Bashir, Huda Abbas, Azzah Khadim Hussain, Hafsa Arshad, and Sadia Bashir collected the data. Ali Hassan Gillani and Wenjing Ji wrote the initial draft. Yu Fang supervised the whole study.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

FUNDING

There is no funding to report

PUBLISHER'S NOTE

This journal remains neutral with regard to jurisdictional claims in published institutional affiliation.

DATA AVAILABILITY

All data generated and analyzed are included within this research article.

REFERENCES

- Anjum U. Total number of active social media users in Pakistan as of 2020. 2020. Available via [Phoneworld.com. pk/active-social-media-users-in-pakistan/](https://phoneworld.com.pk/active-social-media-users-in-pakistan/) (Accessed 30 April 2020).
- Basharat S, Shaikh BT. Polio immunization in Pakistan: ethical issues and challenges. *Public Health Rev*, 2017; 38:1–6.
- Bödeker B, Walter D, Reiter S, Wichmann O. Cross-sectional study on factors associated with influenza vaccine uptake and pertussis vaccination status among pregnant women in Germany. *Vaccine*, 2014; 32:4131–9.
- Carpenter CJ. A meta-analysis of the effectiveness of health belief model variables in predicting behavior. *Health Commun*, 2010; 25:661–9.
- COCONEL Group. A future vaccination campaign against COVID-19 at risk of vaccine hesitancy and politicisation. *Lancet Infect Dis*, 2020; 20:769–70.
- Dawn. Two more polio cases detected in Pakistan. Available via <https://reliefweb.int/report/pakistan/two-more-polio-cases-detected-taking-year-s-tally41#:~:text=There%20are%20only%20two%20countries,to%20carry%20a%20vaccination%20certificate> (Accessed 17 August 2020).
- Dodd RH, Cvejic E, Bonner C, Pickles K, McCaffery KJ, Sydney Health Literacy Lab COVID-19 group. Willingness to vaccinate against COVID-19 in Australia. *Lancet Infect Dis*, 2020; 21:318–9.
- Donaldson B, Jain P, Holder BS, Lindsay B, Regan L, Kampmann B. What determines uptake of pertussis vaccine in pregnancy? A cross sectional survey in an ethnically diverse population of pregnant women in London. *Vaccine*, 2015; 33:5822–8.
- France24. Pakistan confirms first two cases of coronavirus. 2020. Available via <https://www.france24.com/en/20200226-pakistan-confirms-first-two-cases-of-coronavirus> (Accessed 17 April 2020).
- Gillani AH, Chang J, Aslam F, Saeed A, Shukar S, Khanum F, Jairoun A, Nicholson A, Mohamed Ibrahim MI, Fang Y. Public knowledge, attitude, and practice regarding antibiotics use in Punjab, Pakistan: a cross-sectional study. *Expert Rev Anti Infect Ther*, 2021; 19(3):399–411.
- Gillani AH, Amirul Islam FM, Hayat K, Atif N, Yang C, Chang J, Qu Z, Fang Y. Knowledge, attitudes and practices regarding diabetes in the general population: a cross-sectional study from Pakistan. *Int J Environ Res Public Health*, 2018; 15(9):1906.

Government of Pakistan. Know about COVID-19. 2020. Available via <http://covid.gov.pk/> (Accessed 22 August 2020).

Hayat K, Rosenthal M, Xu S, Arshed M, Li P, Zhai P, Desalegn GK, Fang Y. View of Pakistani residents toward coronavirus disease (COVID-19) during a rapid outbreak: a rapid online survey. *Int J Environ Res Public Health*, 2020; 17:3347.

Hussain SF, Boyle P, Patel P. Eradicating polio in Pakistan: an analysis of the challenges and solutions to this security and health issue. *Global Health*, 2016; 12:63.

Janz NK, Becker MH. The health belief model: a decade later. *Health Educ Q*, 1984; 11:1–47.

Kabamba Nzaji M, Kabamba Ngombe L, Ngoie Mwamba G, Banza Ndala DB, Mbidi Miema J, Luhata Lungoyo C, Lora Mwimba B, Cikomola Mwana Bene A, Mukamba Musenga E. Acceptability of vaccination against COVID-19 among healthcare workers in the Democratic Republic of the Congo. *Pragmat Obs Res*, 2020; 11:103–9.

Kabir M, Afzal MS. Epidemiology of polio virus infection in Pakistan and possible risk factors for its transmission. *Asian Pac J Trop Med*, 2016; 9:1044–7.

Khan MU, Ahmad A. Polio vaccination in Pakistan. *Lancet*, 2015; 386:337.

Khan TM, Sahibzada MU. Challenges to health workers and their opinions about parents' refusal of oral polio vaccination in the Khyber Pakhtoon Khawa (KPK) province, Pakistan. *Vaccine*, 2016; 34:2074–81.

Mak DB, Regan AK, Joyce S, Gibbs R, Effler PV. Antenatal care provider's advice is the key determinant of influenza vaccination uptake in pregnant women. *Aust N Z J Obstet Gynaecol*, 2015; 55:131–7.

Nations Online. Administrative Map of Pakistan (Islamic Republic of Pakistan). 2020. Available via <https://www.nationsonline.org/onenworld/map/pakistan-administrative-map.htm> (Accessed 17 July 2020).

Paules CI, Marston HD, Fauci AS. Coronavirus infections—more than just the common cold. *JAMA*, 2020; 323(8):707–8.

Salzberg S. We should consider starting Covid-19 vaccinations now. Available via <https://www.forbes.com/sites/stevensalzberg/2020/08/02/start-vaccinating-now/#3b0576d8cf6e> (Accessed 21 July 2020).

Shah SZ, Saad M, Rahman Khattak MH, Rizwan M, Haidari A, Idrees F. Why we could not eradicate polio from Pakistan and how can we? *J Ayub Med Coll Abbottabad*, 2016; 28(2):423–5.

The Conversation. A majority of vaccine skeptics plan to refuse a COVID-19 vaccine, a study suggests, and that could be a big problem. 2020. Available via <https://theconversation.com/a-majority-of-vaccine-skeptics-plan-to-refuse-a-covid-19-vaccine-a-study-suggests-and-that-could-be-a-big-problem-137559> (Accessed 26 July 2020).

The World Bank. Pakistan. 2020. Available via <https://data.worldbank.org/country/pakistan> (Accessed 22 July 2020).

WHO. Naming the coronavirus disease. 2020a. Available via [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it)

[technical-guidance/naming-the-coronavirus-disease-\(covid-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it) (Accessed 21 August 2020).

WHO. Novel coronavirus situation report-181. 2020b. Available via <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports> (Accessed 19 July 2020).

WHO. More than 150 countries engaged in COVID-19 vaccine global access facility. 2020c. Available via <https://www.who.int/news-room/detail/15-07-2020-more-than-150-countries-engaged-in-covid-19-vaccine-global-access-facility> (Accessed 21 July 2020).

WHO Director General. Media briefing 11 March 2020 Covid-19 a pandemic. Available via <https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020> (Accessed 22 March 2020).

Wong LP, Alias H, Wong PF, Lee HY, AbuBakar S. The use of the health belief model to assess predictors of intent to receive the COVID-19 vaccine and willingness to pay. *Hum Vaccin Immunother*, 2020; 16(9):2204–14.

Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA*, 2020; 323:1239–42.

Zhang Y, Luo X, Ma ZF. Willingness of the general population to accept and pay for COVID-19 vaccination during the early stages of COVID-19 pandemic: a nationally representative survey in mainland China. *Hum Vaccin Immunother*, 2020; 17:1622–7.

Zhu FC, Li YH, Guan XH. Safety, tolerability, and immunogenicity of a recombinant adenovirus type-5 vectored COVID-19 vaccine: a dose-escalation, open-label, non-randomised, first-in-human trial. *Lancet*, 2020; 395:1845–54.

How to cite this article:

Gillani AH, Ji W, Omer S, Bashir S, Arshad H, Akbar J, Bashir K, Abbas H, Hussain AK. Investigating intention to receive the COVID-19 vaccine and willingness to pay among the general public in Pakistan. *J Appl Pharm Sci*, 2022; 12(05):205–212.