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**Article**

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# Consumers' purchase intention of rapid COVID-19 tests

Consumers'  
purchase  
intention

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## Abstract

**Purpose** – This research aims to analyse the variables related to the purchase intention of COVID-19 rapid tests in Monterrey, Mexico's metropolitan area.

**Design/methodology/approach** – The chosen method was probit regression. The results show that purchase intention depends on the consumer's perceived value and the perception of having a potential contagion and/or presenting symptoms related to the virus. Regarding limitations, the sampling method used in this investigation is a nonprobabilistic convenience approach delivered through a digital platform, which may not be the first option in other contexts.

**Findings** – The findings indicate that the probability of the purchase intention of rapid COVID tests increases when consumers perceive symptoms of the disease and when they have higher education or are female rather than concerning price or income, as suggested by classical demand theory.

**Research limitations/implications** – Probabilistic sampling was impossible due to the difficulty of collecting surveys during the COVID-19 pandemic. Instead, a nonprobabilistic sample of a representative random selection of different zip codes from the responses received was considered.

**Originality/value** – The originality of the paper is its contribution to consumer behaviour during the COVID-19 pandemic in a Latin American context.

**Keywords** Rapid COVID-19 tests, Purchase intention, Mexico, Probit, Symptomatology

**Paper type** Research paper

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## 1. Introduction

Purchase intention is a topic that researchers worldwide have studied from many theoretical perspectives. For example, social cognition models, such as the theory of planned behaviour (Ajzen, 1991), the theory of reasoned action (Fishbein, 1979) and the protection motivation theory (Rogers, 1975), have made significant contributions to explaining consumers' beliefs, social perceptions and behaviours (Rutter and Quine, 2002).

However, consumer behaviour after the arrival of COVID-19 may be significantly different from consumer behaviour in other circumstances. In response to the pandemic, governments in all countries developed various public response strategies to contain the spread of the virus, manage health systems and cushion the economic consequences of these actions (Hale *et al.*, 2020). Previous literature has provided valuable lenses to understand purchase intention during the pandemic. Regarding health crises, theories have offered explanations of how consumers behave in relation to their health decisions. Some most cited theories include the health locus of control (Wallston *et al.*, 1976) and self-efficacy theory (Bandura and Adams, 1977). Nevertheless, the context of the COVID-19 crisis is different from those

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presented in previous studies, such as [Painter et al. \(2018\)](#), who analysed the sociodemographic and personal belief factors that contributed to explaining the purchase intention of US residents to pay for the Ebola vaccine, and [Rajamoorthy et al. \(2019\)](#), who used the health belief model (HBM) as a framework to identify attitudinal predictors of willingness to pay for the hepatitis vaccine.

Considering previous research, this study contributes to filling three main gaps. Firstly, most literature related to purchasing intention in the context of a health crisis has not been developed in a Latin American culture, which suggests a knowledge gap related to a level of analysis or phenomenon ([Makadok et al., 2018](#)). [Hofstede \(2011\)](#) finds significant differences among cultures in his research, suggesting different outputs of behaviours. A better theoretical framework to highlight potential differences may be the HBM ([Rosenstock et al., 1988](#)), which provides demographic input that may impact health beliefs, attitudes and behaviours. Secondly, this paper provides empirical support for the most recent theories, such as [Omar et al. \(2021\)](#) that explain consumer behaviour using psychological factors such as uncertainty, perception of severity, perception of scarcity and anxiety, which prompt consumers into panic buying and how these influence behaviour. Thirdly, [Salcedo \(2021\)](#) suggests future research on economic behaviour and marketing science when considering the impacts of global crises such as COVID-19. These topics may enhance academics and practitioners' theoretical framework and managerial practices, as in [Manhas \(2010\)](#) and [Butkouskaya et al. \(2021\)](#).

This paper aims to explore the variables that may influence the purchase intention of rapid COVID-19 tests and offer a theoretical contribution that complements existing knowledge on consumer behaviour, specifically about the intersection of Latin American culture and the pandemic context. Moreover, we offer guidance that may influence managerial decisions to better understand potential consumers of rapid COVID-19 tests. For this purpose, the study presents a background first, and the tests conducted for detecting COVID-19, including the one used in this research, are explained. Secondly, the theoretical framework is analysed, and the conceptual basis of research on the variables that support the intention to purchase health products such as rapid tests is presented. Thirdly, the methodology used to design the instrument, the sample and the model is explained. Finally, the results and conclusions are analysed.

### *1.1 Precedent*

As [Tahamtan and Ardebili \(2020\)](#) note, diagnosis of COVID-19 is critical for pandemic prevention and control. Clinical features alone cannot define the diagnosis of COVID-19, especially for patients presenting with symptoms at disease onset. COVID-19 diagnostic testing aims to determine whether a person is currently infected with SARS-CoV-2, which causes COVID-19.

The Federal Drug Association (FDA) presents three types of SARS-CoV-2 and COVID-19 *in vitro* diagnostic devices. These tests are performed on samples taken from the human body, such as mucus swabs inside the nose or the back of the throat, blood collection or digital puncture [1].

Molecular tests have become a rapid and reliable method for viral detection. Nucleic acid tests include the polymerase chain reaction (PCR) method for detecting some viruses and are characterized by prompt detection and high sensitivity and specificity. [Shen et al. \(2020\)](#) note that the real-time reverse transcriptase PCR (RT-PCR) method is of great interest for detecting SARS-CoV-2 because of its benefits as a specific and straightforward qualitative assay.

The FDA issued emergency use authorizations in the USA for PCR testing using shallow nasal swabs and saliva. However, according to [Bau et al. \(2020\)](#), the high accuracy of RT-PCR does not apply to certain PCRs performed quickly at the point of care as they can bypass up to 48% of infections.

## 2. Literature review

Different consumer theories have been developed over time, specifically in the medical context, to explain, predict and influence the behaviour of patients or the population in the face of events and/or risks such as pandemics. One relevant theoretical model is called the HBM. According to [Rosenstock et al. \(1988\)](#), the model proposes that health-related activities are hypothetically related to three types of factors or beliefs (see [Table 1](#)): (1) modifiable factors, which are demographic variables that predispose the subject to their individual beliefs, such as age, gender, geographic location, education, ethnic origin, health knowledge, migratory status, income and race; (2) individual beliefs, including perceived susceptibility to disease, perceived severity of disease, perceived benefits of preventive action, perceived barriers to preventive action and perceived self-efficacy; and (3) expected action or behaviour that can be encouraged through indications or signals from the media, medical reminders or the illness of a family member.

As a conceptual basis, the HBM is proposed to predict the intention to purchase SARS-CoV-2 tests regarding the variables of age, gender, geographic location, education and income (modifiable factors), price (a perceived barrier to taking preventive action), health status (perceived susceptibility to the disease) and symptomatology (perceived severity of the disease). [Table 2](#) shows the suggested model.

### 2.1 Actions: purchase intention

According to [Ashton et al. \(2010\)](#), purchase intention is consumers' likelihood of buying a product. In addition, various researchers have studied consumer behaviours, which provide important knowledge for developing successful marketing strategies ([Solomon et al., 2006](#)).

Researchers investigated some variables that are closely related to purchase intention. Studies by [Ting and De Run \(2015\)](#) and [Tarkiainen and Sundqvist \(2005\)](#) find that consumers' attitude towards a product is related to their intention to buy, which is consistent with the results of [Chen \(2007\)](#). Thus, individual belief factors, which work through the perceptions of

Modifiable factors	Individual beliefs	Actions
Age		
Gender		
Geographic location	Perceived susceptibility to disease	
Education	Perceived severity of the disease	
Ethnic group	Perceived benefits of preventive action	Behaviour
Health knowledge	Perceived barriers to preventive action	
Migratory status	Perceived self-efficacy	
Income		
Race		

Source(s): [Rosenstock et al. \(1988\)](#)

**Table 1.**  
Health belief model

Modifiable factors	Individual beliefs	Actions
Age	Price (Perceived barrier to preventive action)	Purchase intention
Gender	Health status (Perceived susceptibility to disease)	
Geographic location	Symptomatology (Perceived severity of disease)	
Education		
Income		

Source(s): Adaptation of the HBM by [Rosenstock et al. \(1988\)](#) in the Mexican context

**Table 2.**  
Conceptual model of intention to purchase rapid tests

the population, function as judges that result in either a positive or negative attitude toward rapid screening tests. For this study, the intention to purchase a quick test for COVID-19 screening is proposed as a dependent variable.

### *2.2 Modifiable factors: age, gender, geographic location, education and income*

The effects on consumers' attitudes to sociodemographic factors, such as age, gender, geographic location, education and income, during the COVID-19 pandemic period, have been studied by many researchers (Hesham *et al.*, 2021).

Regarding age, adults are more afraid of COVID-19 than young people are. The older a person is, the greater the person's predisposition to suffer from comorbidities and to be part of the population considered at risk for COVID-19. Meyer (2020) found that gender and age moderated the relationship between the fear of COVID-19 and purchasing intention. That is, age groups react differently to this health pandemic. For example, American and British consumers of health-related goods are millennials and Generation Z; these younger consumers modify their behaviours more dramatically than older generations. From an economic viewpoint, older people feel less affected than younger, working-aged people; from a physiological viewpoint, however, health consequences have forced them to change their purchasing habits. The following hypothesis for the age variable is proposed.

*H1.* The higher an individual's age is, the higher their intention to purchase the test.

Gender differences also affect behaviours and attitudes. Women were more anxious about the COVID-19 pandemic than men, taking considerable precautions to avoid infection (Fekete-Farkas *et al.*, 2021). Haji and Stock (2021) found differences in the responses of males and females to advertising in marketing. Emami and Naderi (2018) found that females are more likely than males to have negative evaluations of services. Similarly, Meyer (2020) noted that women are more likely to be concerned about the effects of the pandemic than men. The hypothesis for gender is as follows:

*H2.* Gender influences the purchase intention of rapid tests.

There is wide inequality in COVID-19 testing by geographic area (Tan *et al.*, 2020). These differences involve disparities in health systems, such as hospitals and healthcare facilities, walk-in testing sites, access to transportation to drive-up testing sites and information regarding the availability of testing. Rader *et al.* (2020) suggested unequal geographic access to COVID-19 testing sites. Tan *et al.* (2020) found that limitations of testing were present in specific geographic areas, such as large Amish and Mennonite populations and Native American communities. The hypothesis applied in the Mexican context is as follows:

*H3.* Geographic location influences the purchase intention of rapid tests.

According to Smeeding and Weinberg (2003), wage income is the total income received for a job performed by an employee in the current year. It is considered a relevant variable as a modifiable factor in the HBM for this research because several public studies have suggested that income is a relevant barrier to accessing health services (Saraceno *et al.*, 2007). Therefore, the following hypothesis is generated for the income variable:

*H4.* The higher income is, the higher individuals' intention to purchase the test.

Formal education is defined as a systematic, organized, structured model with laws and norms corresponding to a curriculum that pursues certain objectives, content and methodologies (Dib, 1988).

The degree of education variable directly correlates with formal education and represents the satisfactory completion of the last academic level studied. Therefore, it is pertinent to

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investigate this variable according to the theoretical model with the hypothesis that the higher an individual's degree of education is, the greater the individual's probability of purchase intention. This is due to greater susceptibility to disease and greater perception of the benefits of carrying out the preventive action of rapid testing. Both individual beliefs are proposed in the HBM. Therefore, concerning this variable, the following hypothesis is generated:

*H5.* The higher the level of education, the higher consumers' intention to purchase the test.

### *2.3 Individual beliefs: price, health status and symptoms*

According to [Lichtenstein et al. \(1993\)](#), price is the monetary amount that must be sacrificed to complete a purchase and sale transaction. The price represents the amount of money that must be given; therefore, the higher the price is, the lower the probability of purchasing goods and services.

In the conceptual proposal of the HBM, price plays a role within individual beliefs as a perceived barrier to preventive action – in this case, the purchase of the rapid test. Therefore, it is possible to contextualize the price concerning the value received. [Zeithaml \(1988\)](#) proposed perceived value as a construct that intervenes in the relationship between price and other nonprice information and purchase intention.

If a product is judged to be of high value, this judgment is expected to result in high purchase intention. The perception of value can be formed independently of the transaction, while purchase intention is formed under the assumption of a forthcoming transaction. Therefore, both constructs are considered essential predictors of purchase ([Chang and Wildt, 1994](#)). Additionally, [Zeithaml \(1988\)](#) suggested that situational or contextual factors may affect the formation of value perception and that perceived value is subject to each individual's frame of reference.

[Winer \(1986\)](#) stated that perceived price is based on the consumer's actual (target) and reference prices. In addition, perceived value influences choice. For their part, [Dodds and Monroe \(1985\)](#) noted that a high perception of product quality is related to a willingness to buy. Additionally, according to [Insch and McBride \(2004\)](#) and [Awada and Yiannaka \(2012\)](#), there is growing empirical evidence that the country of origin and price sensitivity are potent predictors of product purchasing power and purchase intention. Given the above arguments and conceptual framework, the following hypothesis is generated:

*H6.* The higher the price is, the lower consumers' intention to purchase the test.

The definition of health offered by the [World Health Organization \(2006\)](#) corresponds to complete physical, mental and social well-being, not only the absence of disease or illness. Various authors have taken positions on this definition, such as [Briceño-León \(2000\)](#), who affirms that health is a synthesis of a diversity of processes, including the body's biology, the environment, social relations, politics and the international economy. According to [García \(2003\)](#), the perceived state of health is one of the most consolidated and easily obtained indicators in health surveys due to the self-perception of one's state of health. The HBM suggests that concerning personal beliefs, it is possible to perceive the health status as susceptibility to disease. Therefore, we test the following hypothesis concerning this variable:

*H7.* The higher the self-perception of susceptibility to the disease, the higher consumers' intention to purchase the test.

According to [Dodd et al. \(2001\)](#), a symptom is a subjective experience that reflects changes in an individual's biopsychosocial function, sensations or cognition. In this sense, there may be symptoms that are perceived physically or mentally. For example, according to [Holloway and](#)

Zerbe (2000), somatization disorders are physical manifestations of mental pain. Regarding the HBM, recognizing symptoms associated with the disease may lead to the perception of potential severity, which may be a relevant motivator to generate purchase intention for rapid tests. Therefore, the hypothesis regarding this variable is as follows:

H8. The greater the disease's symptomatology, the greater consumers' intention is to purchase the test.

### 3. Method

Following the methodological guidelines of [Aguinis et al. \(2018\)](#), in this section, we first describe the research design. Then, the specific analytical procedure to collect and validate the data is reported. Finally, the econometric model and the operational definition of the variables are presented, including the method used to test the hypothesis.

#### 3.1 Research design

The design is descriptive, correlational and inferential. It is a cross-sectional study in which data were collected from March to April 2020 through a digital platform survey. The geographic area selected for the study was the Monterrey Metropolitan Area (MMA), representing Mexico's third most populated area. The MMA consisted of 12 municipalities: Apodaca, Cadereyta Jiménez, García, San Pedro Garza García, General Escobedo, Guadalupe, Juárez, Monterrey, Salinas Victoria, San Nicolás de los Garza, Santa Catarina and Santiago.

The research analysis and collection of the surveys were conducted during governmental restrictions on mobility and business closures. This data access limitation impeded to considering of a probabilistic sample. Thus, the data were selected considering a nonprobabilistic convenience sample proposed by [Goodman \(1961\)](#). The online survey was sent to men and women of legal age in the MMA, who sent it to their contacts through their social networks. As [Atkinson and Flint \(2001\)](#) note, this method is chosen when the groups to be sampled are difficult to access.

To avoid possible bias in the sample, we adopted the following process. When the surveys were collected, they were organized by the respondents' zip codes to make the study representative. The total number of zip codes registered in these 12 municipalities is 686; therefore, the optimal size of the estimated representative sample with 95% confidence and a 50% probability of success was 246 individuals. This sample was selected randomly from the responses received using different zip codes to represent people from different geographical areas within the MMA. A total of 703 responses were received in the timespan considered.

#### 3.2 Survey design

We developed an instrument to measure how income, price, educational level, physical health and symptoms affect the purchasing power of rapid tests. Firstly, we analysed empirical papers on which a measurement instrument was based and the primary institutional surveys.

- (1) Sociodemographic questions were added to the survey by [INEGI \(2018\)](#) and authors such as [Oliver et al. \(2020\)](#) to identify the sociodemographic characteristics of the respondents, such as age, gender, state of residence and city, level of study, income range and zip code.
- (2) The National Health and Nutrition Survey ([INEGI-INSP, 2019](#)) and [Oliver et al. \(2020\)](#) were used to develop the general health condition questions. For the symptoms of COVID-19, we considered surveys and instruments provided by agencies and researchers about the specific symptoms of COVID-19, such as the United States

Centers for Disease Control and Prevention and the World Health Organization (CDCP, 2020; Grag *et al.*, 2020; World Health Organization, 2020).

- (3) For the items of the demand analysis, economic characteristics were identified, such as the respondents' work sectors, labour benefits, effects on the payment of loans, income and effect on spending and income during COVID-19.
- (4) Concerning purchasing intention, Dodds *et al.* (1991), Baker *et al.* (2020) and Bartik *et al.* (2020) were considered. The instrument included questions such as the price to pay for the test and knowledge of the price.

Secondly, content validation was performed. Previous analyses of the articles referenced for the constructs were considered. Three specialists in the health area were consulted with regard to current health and symptom issues of COVID-19, and three specialists were consulted for the sociodemographic variables and economic impacts. Finally, suitable adjustments were made using the approach applied by Mendoza and Garza (2009). Thirdly, the instrument was designed to be applied through the digital application Kindorse [2] (<https://www.kindorse.com>). This software allows the survey to be sent via WhatsApp and applies the questionnaire to many users in Mexico. In the first stage, a pilot survey was sent to a group of 50 people to adjust the questions according to the responses.

### 3.3 Model and method

The model to determine whether purchase intention exists among the MMA population is as follows:

$$P_i = \beta_0 + \beta_1 Age_i + \beta_2 Gen_i + \beta_3 \sum_{j=1}^{12} Geo_j + \beta_4 GOS_i + \beta_5 Inc_i + \beta_6 Price_i + \beta_5 Health_i + \beta_6 Symptoms_i + e_{it} \quad (1)$$

where

$P_i$  = the purchase intention of the  $i$ -th person, a dichotomous variable where 1 indicates that the person is willing to buy a quick test and 0 indicates the opposite.

$Age_i$  = the discrete variable expressed in years for the  $i$ -th person.

$Gen_i$  = a dichotomous variable that takes the value of 1 if the  $i$ -th person is female and 0 if male.

$Geo_j$  = the geographic location (residence) of a person  $i$  of variable  $j$ . If a person is from Monterrey, the dichotomous variable takes the value of 1 and 0 for the rest of the municipalities, such as Apodaca, Cadereyta Jiménez, García, San Pedro Garza García, General Escobedo, Guadalupe, Juárez, Salinas Victoria, San Nicolás de los Garza, Santa Catarina and Santiago. We consider these 12 dichotomous variables to introduce into the regressions.

$GOS_i$  = Level of Education of the  $i$ -th person using the INEGI (2018) income and expenditure survey as a reference. Dichotomous variables are considered for each level of education; for example, it takes the value of 1 if the respondent's maximum academic level is basic education (less than a bachelor's degree) and zero for the rest (bachelor's degree and postgraduate).

$Inc_i$  = income of the  $i$ -th person, calculated as the average of seven income ranges ranging from 0 to 80,000 Mexican pesos per month and the option of preferring not to answer.



This is based on the ranges of the income and expenditure survey of [INEGI \(2018\)](#), which measures socioeconomic level.

$Price_i$  = the amount that the  $i$ -th person would pay for a COVID-19 rapid test, represented by the average price ranges of \$0–\$500; \$501–\$1,000; \$1,000–\$1,500; and \$1,501–\$3,000 in Mexican pesos.

$Health_i$  = the physical health of the  $i$ -th person considering health status characteristics with five conditions related to comorbidity (if the person has diabetes, hypertension, obesity, smokes or has smoked). If the individual belongs to a specific group, it takes the value of 1 if the individual has at least one condition and zero when there is no condition.

$Symptoms_i$  = a dichotomous variable that takes the value of 1 if the current health status of the  $i$ -th person presents any of the symptoms to detect COVID-19 ([CDCP, 2020](#)); ([World Health Organization, 2020](#)) and 0 if no symptoms are presented, such as fever, dry cough, tiredness, muscle or joint pain, conjunctivitis, nasal congestion, sore throat, diarrhoea, headache, loss of sense of taste and smell, rash or change in skin colour, difficulty breathing or chest pain or tightness.

Because the dependent variable is dichotomous (i.e. “1” indicates a purchase intention and “0” otherwise), a model that fits these data is needed. In this case, the estimates from an ordinary least squares model might be outside the range of 0–1. The probit model for limited dependent variables was selected to avoid this problem. Similar studies on determinants of purchase intention have also used the probit model, such as the one presented by [Kansra and Oberoi \(2022\)](#). However, the standard errors in models with binary dependent variables are not robust, so heteroscedasticity problems arise. A correction for robust standard errors proposed by [Huber \(1967\)](#) and [White \(1980\)](#) was used to obtain better statistical inferences in our model.

#### 4. Results

Firstly, we estimated the correlations to detect possible multicollinearity problems, for which no evidence was found. [Table 3](#) shows correlations.

[Table 4](#) shows the descriptive statistics for the 246 individuals under study from March to April 2020. According to the modifiable descriptive factors, the median age was 38 years with a standard deviation of 12 years, and the age composition of the sample was varied, with the highest percentage of respondents (15%) aged 40–44 years. Seventy per cent of those surveyed were women. The municipality of origin of respondents was very similar to the

Variable	Age	Gender	Geographic location	Level of education	Income	Price	Health	Symptoms
Age	1.000	0.120	0.099	-0.180	0.277	-0.115	0.377	-0.129
Gender	0.120	1.000	-0.037	0.105	-0.266	0.097	0.073	-0.009
Geographic location	0.099	-0.037	1.000	0.010	0.039	0.158	0.020	0.046
Level of education	-0.180	0.105	0.010	1.000	-0.379	-0.043	-0.130	0.020
Income	0.277	-0.266	0.039	-0.379	1.000	0.033	0.099	-0.004
Price	-0.115	0.097	0.158	-0.043	0.033	1.000	0.008	0.030
Health	0.377	0.073	0.020	-0.130	0.099	0.008	1.000	-0.082
Symptoms	-0.129	-0.009	0.046	0.020	-0.004	0.030	-0.082	1.000

Source(s): Own elaboration

**Table 3.**  
Correlations of variables

population; most came from Monterrey, Guadalupe and San Nicolás de los Garza, and 39% of those surveyed came from Monterrey. A total of 20% of respondents had a basic educational level. The mean income was 14,526 Mexican pesos monthly per family, with a standard deviation of 14,708 pesos.

Regarding individual beliefs, the respondents were willing to spend an average of 550 Mexican pesos for the COVID-19 rapid test. The healthy group represented 36% of the total individuals in the sample. Finally, on average, the purchase intention was 64%, according to the participants. Skewness and kurtosis coefficients were calculated to characterize the position and degree of concentration in the data and the selection of the data. High kurtosis values indicate the presence of outliers and suggest the nonnormality of the series. The sample includes individuals from different areas in terms of all variables.

Some authors note that logistic regression is more robust than discriminant analysis as it requires fewer assumptions (Pérez and Santín, 2007). Therefore, we considered estimating the probit model. The results remained unchanged in both the significance of the estimators and the signs.

Subsequently, Equation (1) model was estimated through the probit model considering limited dependent variables. The results indicated that the significant variables were Age, Gen (Gender), GOS (*Grade of Studies*), Inc. (Income) and symptomatology related to COVID-19 (*Symptoms*); see Table 5.

The results of the estimated model eliminated the variables *price* and *health and geographic location* because no evidence was found that these variables affected purchase intention (Table 5). However, it is interesting to observe the *income* variable, which has a positive value and is significant at the 5% confidence interval (CI), which means that an increase in a person's income can increase the probability of purchase. The *symptoms* variable also takes a positive value but is significant at the 10% CI; if a person presents any symptoms related to the disease, then his or her probability of purchase increases. Omar et al. (2021) noted that these results

	Purchase intention	Age	Gender	Geographic location	Level of education	Income	Price	Health	Symptoms
Mean	0.64	38	0.7	0.39	0.20	14,526	555	0.36	0.08
Std. Dev	0.47	12	0.45	0.48	0.40	14,708	421	0.48	0.28
Skewness	-0.62	0.4	-0.90	0.48	1.45	0.991059	4.12	0.56	2.88
Kurtosis	1.38	2.72	1.81	1.23	3.12	3.009027	21.37	1.31	13.07
Jarque-Bera	38.92	4.62	28.35	24.33	51.81	36.83	2,467	38.44	44.29
Probability	0.0000	0.0900	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Source(s): Own elaboration

Table 4. Descriptive statistics of the sample

Variable	Coefficient	Statistic Z
Income	0.000019	(2.5114)**
Symptoms	0.708788	(1.6511)*
Level of Education	-0.589640	(-2.8647)**
Age	-0.014428	(-2.1049)**
Gender	0.379898	(1.8542)*
C	1.804566	(1.8045)*

Note(s): \*p value < 0.10, \*\*p value < 0.05. Percentage of success of the model: 67%, Huber-White standard error correction

Source(s): Own elaboration

Table 5. Probability model of purchase intention for COVID-19 rapid tests

agree with the perception of severity and purchase of a rapid test. In contrast, the basic educational level variable (*Grade of Studies*) is negative and significant at 5%. Therefore, the purchase probability reduces if someone has less than a bachelor's degree. Similarly, [Rajamoorthy et al. \(2019\)](#) found that education determined the intention to obtain the hepatitis B vaccine.

The results also indicated a negative coefficient in the *age* variable with 5% significance. Older people tend to buy fewer COVID-19 rapid tests than younger people. This finding is consistent with the one presented by [Meyer \(2020\)](#).

Finally, we found that women tended to buy more COVID-19 rapid tests than men. In this regard, [Meyer \(2020\)](#) noted that women are more likely to purchase health products, and [Fekete-Farkas et al. \(2021\)](#) found that women are more cautious and fearful of COVID-19. The results of the hypotheses of this research are presented in [Table 6](#).

To determine the probability of purchasing the tests, because we surveyed the market during the second and third week of June when there was less alarm or contagion, we estimated the marginal effects with the average values of the variables, as shown in [Table 7](#). An interesting result is observed in the coefficient of the *income* variable, which shows a small value close to zero. This low impact can be explained by [Canbay and Kirca \(2021\)](#), who find no significant causal relationship between total health spending and per capita income in the BRICS + T countries.

## 5. Discussion

### 5.1 Theoretical implications

This research provides interesting findings regarding purchase intention studied through the lens of a Latin American population during a pandemic ([Makadok et al., 2018](#)). As suggested

**Table 6.**  
Results of the stated hypotheses

Hypothesis	Result
H1 The higher age is, the higher consumers' intention to purchase the test	Supported
H2 Gender influences the purchase intention of rapid tests	Supported
H3 Geographic location influences the purchase intention of rapid tests	Not Supported
H4 The higher income is, the higher consumers' intention is to purchase the test	Supported
H5 The higher the level of education, the higher consumers' intention is to purchase the test	Supported
H6 The higher the price is, the lower consumers' intention is to purchase the test	Not Supported
H7 The higher the self-perception of being susceptible to the disease, the higher consumers' intention is to purchase the test	Not Supported
H8 The greater the symptomatology of the disease is, the greater the intention of consumers to purchase the test	Supported

**Source(s):** Own elaboration

**Table 7.**  
Marginal effects

Variables	Coefficient
<i>Income</i>	0.000014
<i>Symptoms</i>	0.520670
Grade of Studies	-0.433145
Age	-0.010599
Gender	0.279070
C	0.423544

**Source(s):** Own elaboration

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by Salcedo (2021), we compare and contrast previous results on related research to explain the results that may contribute to existing theory.

We present an interesting approach explained by perceived value regarding the price variable. We believe that if a consumer does not perceive that he or she is sick, the consumer will conclude that a test is unnecessary, perhaps not even free. This understanding is consistent with the results of hypothesis 6, suggesting that the higher the test price, the lower the purchase intention, which is not significant in this case. However, if consumers have a fever, diarrhoea or cough, they might believe they are sick and perceive a need for the test. This finding is connected with hypothesis 8, suggesting a relation between symptomatology and the intention to purchase the test, which is statistically significant. In that case, the price of the test is irrelevant, which is why the model makes sense. The market value for the manufacturer is higher because as more people get sick and herd immunity is not achieved, more testing will be needed.

The probability of purchasing the rapid test increases to 53% in the presence of at least one symptom. Although the impact of income is positive, its marginal effect is low because an increase in salary of 1,000 Mexican pesos is needed to increase the probability of purchase by 1%. During this study, some people indicated that they were laid off or had closed their businesses because of the pandemic, so they were not receiving income. This finding also suggests that the intention to purchase a rapid test may be influenced by disposable income concerning countries' GDP and economic power, placing Latin American countries in a more difficult position than developed economies.

About education, if a person's level of education is less than a bachelor's degree, the probability of purchase is reduced by almost 40% compared to people with a bachelor's degree or some postgraduate education. Awareness of an illness and its consequences is proposed by the HBM, making this finding consistent with the model.

However, the results also show an average probability that 72% of the respondents intended to purchase a rapid test, which could result from the effect of the health crisis. The findings might have differed if we had conducted the survey months later. This is also consistent with the HBM; the author added a "cue" component for constant information about a particular situation. Thus, it is also possible that the coefficient of the *symptoms* variable could be higher if consumers are more informed and alarmed by news and information received by different media.

### 5.2 Practical implications

In addition to scholars, two audiences may be especially interested in this research. Firstly, rapid-test manufacturers and laboratories seek a better understanding of their future customers. Secondly, governments look for the right decisions to improve the health of their citizens.

Evidence shows that symptomatology raises the likelihood of purchase. For example, public health communication can focus on the importance of awareness of any symptoms related to COVID-19 that may act as a trigger to purchase, consistent with the HBM. Education level also seems to matter, which may be related to the fact that this population knows about the illness and the possible consequences of not detecting it early.

These findings may enhance the understanding of laboratories concerning their pricing strategies for segments that are usually targeted based on their market research, which usually includes demographics such as income. However, the main practical use for governments comes from the insight into symptoms related to COVID-19. The evidence suggests that if mass media communication encourages citizens to be self-aware of related COVID-19 symptoms, they may be less reluctant to test when finding them, thus increasing the intention to purchase a rapid test. This is especially relevant so governments can have diagnostics, data and control for diseases that may threaten public health.

### 5.3 Future research

Future research may explore other levels in the taxonomy of contributions to theory (Makadok *et al.*, 2018), such as causal mechanisms. The HBM can assess cultural aspects and values as modifiable factors using cultural dimension theory as input (Hofstede, 2011). Regarding the limitations of this study, we identify two main avenues for future research.

- (1) The present research was conducted in a public health emergency and tested hypotheses related to individuals' purchase intentions in a Mexican region at the intersection of analysis and phenomena (the COVID-19 health crisis). The results of this study may not be generalizable to other countries because governments have used different mechanisms to address COVID-19. The replication of this study in other countries may contribute to identifying gaps in the literature.
- (2) Probabilistic random sampling could not be conducted due to the difficulty of accessing the population in an environment of low mobility due to the pandemic. Instead, we used a nonprobabilistic convenience sample. A future investigation could involve a systematic and face-to-face sample.

## 6. Conclusions

The issue behind this research, the COVID-19 pandemic, is a challenge that governments have openly discussed. Furthermore, the official infection data presented are generated in populations that have been tested for COVID-19. Therefore, testing and transparency are of great importance for keeping the population on alert and emphasizing the size of the problem and the potential disease risk.

This research explored the variables that may influence the purchase of rapid tests to diagnose COVID-19. The framework for this paper was the HBM, and the hypotheses considered age, sex, geographic location, income, level of education and price as modifiable variables. In addition, regarding health beliefs, the perception of susceptibility to the disease and greater symptomatology of the disease were tested. Finally, the expected behaviour or dependent variable was the intention to purchase the COVID-19 rapid test.

The evidence shows that age, sex, level of education and income are modifiable variables statistically significant in predicting purchase intention. Regarding health beliefs, only symptomatology was significant in the model.

These findings may be interesting for governments seeking a better understanding of what matters to a population (in this case, Monterrey's metropolitan area) that shares Latin American culture, beliefs and values and how these factors contribute to the intent to purchase rapid tests.

### Notes

1. <https://www.fda.gov/medical-devices/coronavirus-disease-2019-covid-19-emergency-use-authorizations-medical-devices/vitro-diagnostics-euas#isft2>
2. A platform collecting survey data focused on consumer behaviour.

### References

- Aguinis, H., Ramani, R.S. and Alabduljader, N. (2018), "What you see is what you get? Enhancing methodological transparency in management research", *Academy of Management Annals*, Vol. 12 No. 1, pp. 83-110.
- Ajzen, I. (1991), "The theory of planned behavior", *Organizational Behavior and Human Decision Processes*, Vol. 50 No. 2, pp. 179-211.

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- Ashton, A., Scott, N., Solnet, D. and Breakey, N. (2010), "Hotel restaurant dining: the relationship between perceived value and intention to purchase", *Tourism and Hospitality Research*, Vol. 10 No. 3, pp. 206-218.
- Atkinson, R. and Flint, J. (2001), "Accessing hidden and hard-to-reach populations: snowball research strategies", *Social Research Update*, Vol. 33, pp. 1-4.
- Awada, L. and Yiannaka, A. (2012), "Consumer perceptions and the effects of country of origin labeling on purchasing decisions and welfare", *Food Policy*, Vol. 37 No. 1, pp. 21-30.
- Baker, S., Farrokhnia, R., Meyer, S., Pagel, M. and Yanneli, C. (2020), "How does household spending respond to an epidemic? Consumption during the 2020 COVID-19 pandemic", *The Review of Asset Pricing Studies*, Vol. 10 No. 4, pp. 834-862.
- Bandura, A. and Adams, N.E. (1977), "Analysis of self-efficacy theory of behavioral change", *Cognitive Therapy and Research*, Vol. 1 No. 4, pp. 287-310.
- Bartik, A.W., Bertrand, M., Cullen, Z.B., Glaeser, E.L., Luca, M. and Stanton, C.T. (2020), *How Are Small Businesses Adjusting to Covid-19? Early Evidence from a Survey*, National Bureau of Economic Research, Cambridge, MA.
- Bau, A., Zinger, T., Inglima, K., Atie, O., Yurasits, L., See, B. and Agüero-Rosenfeld, M. (2020), "Performance of the rapid Nucleic Acid Amplification by Abbott ID NOW COVID-19 in nasopharyngeal swabs transported in viral media and dry nasal swabs, in a New York City academic institution", available at: <https://www.biorxiv.org/content/10.1101/2020.05.11.089896v2>
- Briceño-León, R. (2000), "Bienestar, salud pública y cambio social", in *Salud y equidad: una mirada desde las ciencias sociales*, FIOCRUZ, pp. 15-24.
- Butkouskaya, V., Llonch-Andreu, J. and Alarcón-del-Amo, M. (2021), "The impact of customer performance on IMC outcomes: firm size moderation in the inter-country context", *Journal of Economics, Finance and Administrative Science*, Vol. 26 No. 52, pp. 358-375.
- Canbay, Ş. and Kirca, M. (2021), "Health expenditures (total, public and private) and per capita income in the BRICS+T: panel bootstrap causality analysis", *Journal of Economics, Finance and Administrative Science*, Vol. 27 No. 53, pp. 52-67.
- CDCP (2020), "Enfermedad del coronavirus 2019 (COVID-19)", available at: <https://espanol.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-at-higher-risk.html>
- Chang, T.-Z. and Wildt, A. (1994), "Price, product information, and purchase intention: an empirical study", *Journal of the Academy of Marketing Science*, Vol. 22 No. 1, pp. 16-27.
- Chen, M. (2007), "Consumer attitudes and purchase intentions in relation to organic foods in Taiwan: moderating effects of food-related personality traits", *Food Quality and Preference*, Vol. 18 No. 7, pp. 1008-1021.
- Dib, C. (1988), "Formal, non-formal and informal education: concepts/applicability", *AIP Conference Proceedings*, Vol. 173, pp. 300-315.
- Dodd, M., Janson, S., Facione, N., Faucett, J., Froelicher, E., Humphreys, J. and Taylor, D. (2001), "Advancing the science of symptom management", *Journal of Advanced Nursing*, Vol. 33 No. 5, pp. 668-676.
- Dodds, W. and Monroe, K. (1985), "The effect of brand and price information on subjective product evaluations", *Advances in Consumer Research*, Vol. 12 No. 1, pp. 85-90.
- Dodds, W., Monroe, K. and Grewal, D. (1991), "Effects of price, brand, and store information on buyers' product evaluations", *Journal of Marketing Research*, Vol. 28 No. 3, pp. 307-319.
- Emami, A. and Naderi, N. (2018), "Impact of situation in the study of gender entrepreneurship and opportunity evaluation: an analysis of risk disposition", in *Competitiveness in Emerging Markets*, Springer, Cham, pp. 427-445.
- Fekete-Farkas, M., Gholampour, A., Bouzari, P., Jarghooiyan, H. and Ebrahimi, P. (2021), "How gender and age can affect consumer purchase behavior? Evidence from a microeconomic perspective from Hungary", *AD-Minister*, Vol. 39, pp. 25-46.

- Fishbein, M. (1979), "A theory of reasoned action: some applications and implications", *Nebraska Symposium on Motivation*, Vol. 27, pp. 65-116.
- García, A.A. (2003), "Percepción del estado de salud", *Revista Multidisciplinar de Gerontología*, Vol. 13 No. 5, pp. 340-342.
- Goodman, L.A. (1961), "Snowball sampling", *The Annals of Mathematical Statistics*, Vol. 32 No. 1, pp. 148-170.
- Grag, S., Kim, L., Whitaker, M., O'Halloran, A., Cummings, C., Holstein, R. and Openo, K. (2020), "Hospitalization rates and characteristics of patients hospitalized with laboratory confirmed coronavirus disease 2019", *Morbidity and Mortality Weekly Report*, Vol. 69 No. 15, pp. 458-464.
- Haji, R. and Stock, W.G. (2021), "User settings for advertising optimization on Facebook: active customer participation or settings blindness?", *Telematics and Informatics*, Vol. 59, 101548.
- Hale, T., Kira, B., Petherick, A., Phillips, T. and Webster, S. (2020), "Variation in government responses to COVID-19", available at: <https://www.bsg.ox.ac.uk/sites/default/files/2020-05/BSG-WP-2020-032-v6.0.pdf>
- Hesham, F., Riadh, H. and Sihem, N.K. (2021), "What have we learned about the effects of the COVID-19 pandemic on consumer behavior?", *Sustainability*, Vol. 13 No. 8, p. 4304.
- Hofstede, G. (2011), "Dimensionalizing cultures: the Hofstede model in context", *Online Readings in Psychology and Culture*, Vol. 2 No. 1, pp. 2307-0919.
- Holloway, K. and Zerbe, K. (2000), "Simplified approach to somatization disorder: when less may prove to be more", *Postgraduate Medicine*, Vol. 108 No. 6, pp. 89-95.
- Huber, P.J. (1967), "The behavior of maximum likelihood estimates under nonstandard conditions", *Proceedings of the Fifth Berkeley Symposium on Mathematical Statistics and Probability*, Vol. 5, pp. 221-233.
- INEGI (2018), "Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH), Nueva serie", available at: <https://www.inegi.org.mx/programas/enigh/nc/2018/>
- INEGI-INSP (2019), "Encuesta Nacional de Salud y Nutrición - 2018", available at: <https://ensanut.insp.mx/encuestas/ensanut2018/index.php> (accessed 15 April 2020).
- Insch, G. and McBride, B. (2004), "The impact of country-of-origin cues on consumer perceptions of product quality: a binational test of the decomposed country-of-origin construct", *Journal of Business Research*, Vol. 57 No. 3, pp. 256-265.
- Kansra, P. and Oberoi, S. (2022), "Determinants of online purchase intention among young consumers in Punjab: a cross-sectional study", *International Journal of Social Ecology and Sustainable Development*, Vol. 13 No. 6, pp. 1-14.
- Lichtenstein, D., Ridgway, N. and Netemeyer, R. (1993), "Price perceptions and consumer shopping behavior: a field study", *Journal of Marketing Research*, Vol. 30 No. 2, pp. 234-245.
- Makadok, R., Burton, R. and Barney, J. (2018), "A practical guide for making theory contributions in strategic management", *Strategic Management Journal*, Vol. 39 No. 6, pp. 1530-1545.
- Manhas, P.S. (2010), "Strategic brand positioning analysis through comparison of cognitive and conative perceptions", *Journal of Economics, Finance and Administrative Science*, Vol. 15 No. 29, pp. 17-33.
- Mendoza, J.G. and Garza, J.B. (2009), "La medición en el proceso de investigación científica: evaluación de validez de contenido y confiabilidad (Measurement in the scientific research process: content validity and reliability evaluation)", *Innovaciones de negocios*, Vol. 6 No. 11, pp. 17-32.
- Meyer, S. (2020), "Understanding the COVID-19 effect on online shopping behaviour", *Big Commer*, Vol. 2, pp. 1-16.
- Oliver, N., Xavier, B., Roomp, K. and Roomp, K. (2020), "Assessing the impact of the COVID-19 pandemic in Spain: large-scale, online, self-reported population survey", *Journal of Medical Internet Research*, Vol. 22 No. 9, pp. 1-16.

- Omar, N., Nazri, M., Ali, M. and Alam, S. (2021), "The panic buying behavior of consumers during the COVID-19 pandemic: examining the influences of uncertainty, perceptions of severity, perceptions of scarcity, and anxiety", *Journal of Retailing and Consumer Services*, Vol. 62, 102600.
- Painter, J., Fricken, M., Mesquita, S. and DiClemente, R. (2018), "Willingness to pay for an Ebola vaccine during the 2014–2016 ebola outbreak in West Africa: results from a U.S. National sample", *Human Vaccines and Immunotherapeutics*, Vol. 14 No. 7, pp. 1665-1671.
- Pérez, C. and Santín, D. (2007), *Minería de datos: Técnicas y herramientas*, Ediciones Paraninfo, Madrid.
- Rader, B., Scarpino, S.V., Nande, A., Hill, A.L., Adlam, B., Reiner, R.C., Pigott, D.M., Gutierrez, B., Zarebski, A.E., Shrestha, M., Brownstein, J.S., Castro, M.C., Dye, C., Tian, H., Pybus, O.G. and Kraeme, M.U.G. (2020), "Crowding and the shape of COVID-19 epidemics", *Nature Medicine*, Vol. 26 No. 12, pp. 1829-1834.
- Rajamoorthy, Y., Radam, A., Taib, N., Rahim, K., Munusamy, S. and Wagner, A. (2019), "Willingness to pay for hepatitis B vaccination in Selangor, Malaysia: a cross-sectional household survey", *PLoS ONE*, Vol. 14 No. 4, e0215125.
- Rogers, R. (1975), "A protection motivation theory of fear appeals and attitude change 1", *The Journal of Psychology*, Vol. 91 No. 1, pp. 93-114.
- Rosenstock, I., Strecher, V. and Becker, M. (1988), "Social learning theory and the health belief model", *Health Education Quarterly*, Vol. 15 No. 2, pp. 175-183.
- Rutter, D. and Quine, L. (2002), "Social cognition models and changing health behaviours", in Rutter, D. and Quine, L. (Eds), *Changing Health Behaviour: Intervention and Research with Social Cognition Models*, Berkshire, pp. 1-27.
- Salcedo, N.U. (2021), "Editorial: an upcoming 30th anniversary encouraging the papers' publication", *Journal of Economics, Finance and Administrative Science*, Vol. 26 No. 51, pp. 2-6.
- Saraceno, B., van Ommeren, M., Batniji, R., Cohen, A., Gureje, O., Mahoney, J. and Underhill, C. (2007), "Barriers to improvement of mental health services in low-income and middle-income countries", *The Lancet*, Vol. 370 No. 9593, pp. 1164-1174.
- Shen, C., Wang, Z., Yang, Y., Zhao, F., Li, J., Yuang, J. and Peng, L. (2020), "Treatment of 5 critically ill patients with COVID-19 with convalescent plasma", *Jama Network*, Vol. 323 No. 16, pp. 1582-1589.
- Smeeding, T. and Weinberg, D. (2003), "Toward a uniform definition of household income", *Review of Income and Wealth*, Vol. 47 No. 1, pp. 1-24.
- Solomon, M., Bamossy, G., Askegaard, S. and Hogg, M.K. (2006), *Consumer Behaviour, a European Perspective*, Prentice Hall, Harlow.
- Tahamtan, A. and Ardebili, A. (2020), "Real-time RT-PCR in COVID-19 detection: issues affecting the results", *Expert Review of Molecular Diagnostics*, Vol. 20 No. 5, pp. 453-454.
- Tan, T.Q., Kullar, R., Swartz, T.H., Mathew, T.A., Piggott, D.A. and Berthaud, V. (2020), "Location matters: geographic disparities and impact of coronavirus disease 2019", *The Journal of Infectious Diseases*, Vol. 222 No. 12, pp. 1951-1954.
- Tarkiainen, A. and Sundqvist, S. (2005), "Subjective norms, attitudes, and intentions of Finnish consumers in buying organic food", *British Food Journal*, Vol. 107 No. 11, pp. 808-822.
- Ting, H. and De Run, E.C. (2015), "Attitude towards advertising: a young generation cohort's perspective", *Asian Journal of Business Research*, Vol. 5 No. 1, pp. 69-82.
- Wallston, B.S., Wallston, K.A., Kaplan, G.D. and Maides, S.A. (1976), "Development and validation of the health locus of control (HLC) scale", *Journal of Consulting and Clinical Psychology*, Vol. 44 No. 2, p. 580.
- White, H. (1980), "A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity", *Econometrica*, Vol. 48 No. 4, pp. 817-838.



- Winer, R. (1986), "A reference price model of brand choice for frequently purchased products", *Journal of Consumer Research*, Vol. 13 No. 2, pp. 250-256.
- World Health Organization (2006), "Constitución de la Organización mundial de la Salud", available at: [https://www.who.int/governance/eb/who\\_constitution\\_sp.pdf](https://www.who.int/governance/eb/who_constitution_sp.pdf)
- World Health Organization (2020), "Preguntas y Respuestas sobre la enfermedad por coronavirus (COVID-19)", available at: <https://www.who.int/es/emergencies/diseases/novel-coronavirus-2019/advice-for-public/q-a-coronaviruses>
- Zeithaml, V. (1988), "Consumer perceptions of price, quality, and value: a means-end model and synthesis of evidence", *Journal of Marketing*, Vol. 52 No. 3, pp. 2-22.

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