Original Research

**Knowledge, attitudes, and perception susceptibility towards the
COVID-19 pandemic in Latin American region**

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Highlights

- Knowledge of COVID-19 has been associated with improved attitudes and behavior in addressing the spread of COVID-19.
- Attitudes, perception susceptibility and perception risk may potentially influence people non-compliance with government protocols and practices towards COVID-19.
- Informed people have a better understanding when it comes to adopting control measures and preventive strategies related to COVID-19.
- Psycho-educational strategies are to be implement as part of prevention and health promotion, to increase healthy practices.

ABSTRACT

BACKGROUND: Latin American countries have been strongly affected by COVID-19. Due to the alarming prevalence of cases, we set out to explore which psychosocial elements may be exerting an influence on the poor compliance with mandatory control measures among the population.

OBJECTIVE: We aimed to assess knowledge, attitude, and susceptibility perception of Latin American population during the coronavirus outbreak.

METHOD: We collected data from 600 self-selected participants through a web-based cross-sectional survey evaluating demographic information. The respondents were between 16 to 77 years old. The majority of the participants were female (n= 382), graduated professionals (56.8 %), citizens living in any country in South America (72.2%).

RESULTS: Logistic regression showed that knowledge is highly related with age ($p=0.010^*$), attitude is related with marital status ($p=0.017^*$), perception susceptibility is related with education ($p=0.049^*$), marital status ($p=0.001^{**}$) and occupation ($p=0.001^{**}$). Our study identified that, although people reported adequate knowledge by identifying expected symptoms and coronavirus transmission process. There is a significant perceived susceptibility to contracting the mentioning virus (57.7%), displaying stigmatized behavior (59.1%), fear of contracting the virus from others (70.2%), and concern regarding serious consequences after the COVID-19 disease (72.3%). Additionally, we found that people distrust National Health administration's response (61.57%), preparedness for the disease (73.8%), and suggesting insufficient measures to deal with COVID-19 disease (61.3%).

CONCLUSION: Within the framework of government regulations, it is suggested that guidelines be considered to expand strategies and provide reliable knowledge to facilitate positive attitudes towards protection measures against COVID-19. Communication strategies would serve both to contain psychological reactions and the perception of risk of contagion, as well as educational actions to ensure compliance with public control measures among the population.

KEYWORDS: Attitudes, COVID-19, health communication, knowledge, perception, public health, primary prevention.

INTRODUCTION

The emergence of the new coronavirus, nominated as 2019-nCoV by the World Health Organization, has dominated the news around the world in recent months. In late December 2019, unexplained cases of pneumonia appeared in Wuhan, China, whose rapid transmission capacity has disrupted many countries worldwide (1,2). In fact, at the time this study was written, the coronavirus had already reached pandemic proportions with 5.5 million confirmed cases worldwide (2,3).

Strict restrictive measures were imposed to mitigate the proliferation of the virus in each country; Indeed, many procedures were implemented following the strategies of Asian and later European countries. Similarly, in many South American countries, protocols were proposed ranging from sanitization behaviors, movement restrictions, and suspension of total activities, like those reported in Peru (4). It should be noted that most previous studies on epidemics, especially during its development are based on descriptive studies (5,6) which leave aside theoretical foundations on risk perception and the role of the individual on addressing the disease. Consequently, it is quite useful to understand the subjective conception of contagion risk, as well as the psychological and socio-cultural factors associated with compliance to disease control protocols.

Given the importance of identifying behavioral factors influencing non-compliance with government protocols, and attitudes around COVID-19, psychological elements would help explain the ineffective mitigation of the spread of the pandemic in South America. In this regard, Sander Van Der Linden's model of socio-psychological determinants (7), proposes not only cognitive elements (e.g., people's knowledge and understanding of risk), but emotional and experiential variables (e.g., subjective experiences), as well as socio-cultural conceptions (e.g., social interpretation of risk, culture, and values). This approach points to subjective differences (e.g., gender, education, ideology); and finally, the model considers personal knowledge about effective measures to explain the attitudes variability and the pandemic perception among the population (7).

The exploration of the level of adoption of health measures, as well as the acceptance of policies to mitigate the rapid spread of the virus in Western culture urges particular attention. Particularly in South America, the number of cases of COVID-19 has increased exponentially (Figure 1). Cases of contagion and death are beginning to overtake various European and Asian countries, becoming the new epicenter of the world. For instance, Peru reported more than 191,758 cases; Brazil has more than 676,494 cases, surpassing several European countries such as Russia with

467,673 cases or Spain with 288,390 cases (3). Mexico has more than 113,619 cases, which is less to Chile's 127,745 cases (3).

The proportion of deaths is beginning to significantly exceed countries previously reported as severely affected, as is the case of Spain (28,000 deaths). It is important to consider that since the first report of COVID-19 in China, the policies adopted in several Latin American countries have been deployed with a delay of 1 to 2 months. A particular case of analysis at the Latin American level is Peru, whose social, health and protection policies (social distancing, hand washing, border closures, among others) were implemented early on, yet the results were not successful compared to other countries that proceeded in the same direction (4).

In this context, it should be noted that public health and safety policies respond to the governmental system of each country, public health regulations appear to be ineffective in preventing the proliferation of the virus. In addition to the already complex process of containing the spread of the virus, behavioral problems arise as a limiting factor in the general population. One of the notable differences between developed and Latin American countries is their capacity to respond to the crisis. While in Asian countries the level of follow-up to control measures was undeniable, some social groups in Latin American countries may be having difficulties in adhering to such measures. Particularly, certain behaviors of non-compliance with protection measures are evident (8). Thus, vulnerability in Latin America due to poverty and extreme poverty, poor access to social and health systems, insufficient preventive strategies, among others may affect health outcome. The above elements contribute to the adherence or rejection to imposed policies, yet they are not the only associated factors; access to education and accurate information on COVID-19 has an essential role to play.

Knowledge about virus transmission and management appears to be vital for containing levels of mass spread. In parallel, it is widely known that people exposed to an epidemic experience multiple adverse effects (9,10). Hence, understanding people conceptions regarding risk could substantially influence the response to the existing threat (1,11,12). In light of the increasing rate of infected individuals remarkably in Latin America, it becomes very difficult to ignore the human factors implicit in the pandemic dissemination. Furthermore, by comparing other types of risks such as environmental accidents and natural disasters, infectious diseases and limiting food access and health due to quarantine trigger conflicting attitudes in the population that require exploration (5).

Attitude is associated with disease knowledge (13). The literature states that greater knowledge of COVID-19 promotes better attitude and practices against its proliferation. Consequently, health-

educational strategies would greatly increase healthy practices (13,14), given that a supportive attitude towards the adoption of safety and health protection protocols has a significant impact on the proliferation of the disease (15), and the adoption of preventive health behaviors (16). A recent study conducted during COVID-19, across Europe, America, and Asia with a relatively large sample (n=6991), describes that subjective factors such as risk perception, values, personal and cultural experiences may predict avoidable risk behaviours during the spread of the pandemic. The aforementioned study points out the importance of understanding subjective risk perception in order to manage public health risk (15).

The perceived risk in a critical situation is usually codified based on personal constructs (Barbisch et al., 2015), relating to personality, mental health, lifestyles and perceptions regarding how the pandemic progresses in a particular community. Data on risk perception in global samples demand further exploration of population's perception about the coronavirus (15,17,18). In addition, it is noted that "risk perception" is being studied with greater interest lately in response to previous epidemics (15). Confronted by these factors, we propose an examination of subjective psychological mechanisms that would serve as predictors of risk behavior. The purpose of this study is to explore the interacting dynamics of knowledge, perception and attitude within Latin American population in the face of COVID-19. We consider that this study offers an important contribution given the limited number of studies carried out in Latin American contexts.

MATERIALS AND METHOD

Participants

This is a descriptive, cross-sectional study through a survey (Montero & León, 2007), conducted between March 15 and May 17. An initial sample of 600 individuals was recruited. The mean age was 33.48 ± 11.268 , ranged from 16 to 77 years old, and 63.7% were females. The survey questions were adapted and modified from previously published literature regarding viral epidemics (11,12,19–25). The test respondents commented that the questions were easily understood, and the average completion time was 10 min. Informed consent was obtained before starting the survey. Respondents were assured that their responses would be confidential and reminded that their participation in the survey was voluntary. Their knowledge and attitude were evaluated against facts published by WHO (2,3).

Instrument: Knowledge, Attitude and perception questionnaire

Zegarra-Valdivia et al., previous describe this questionnaire (4). Briefly, this instrument is divided into 6 sections as follows: a) knowledge about coronavirus (COVID-19) infection, b) transmission, and c) perception of disease severity, d) perceived susceptibility, e) prevention attitudes, and f) behavioral response to COVID-19 infection. All the answers were display as Likert scale, agree, not sure/maybe, and disagree; yes, no, or do not know, or very likely, probable, and unlikely or high, middle, and low. A score of one was assigned to a correct answer and a value of zero to an incorrect answer or “do not know” responses. Total score of a + b is considered the total knowledge score, c + e was the total score of attitude against COVID-19, and d + f was the perception susceptibility. We consider that the cut-off was at least 70% of the total score for Knowledge and Attitude. Regarding perception susceptibility, the cut-off was >30%. We use these cut-off points to divide the sample between less/more knowledge, less/more positive attitude against COVID-19, and less/more frequent perception susceptibility.

Ethical Statement

All participants were inform about the aims of this study and gave written informed consent. This study follows ethics guidelines and was approve by the local ethics committee. All data was collected in an anonymous database.

Data Analysis

Socio-demographic characteristics of the participants included in the study sample were compared with chi2 tests, as well as the percentages of answers. Reliability was measure by Cronbach alpha. Relation between variables was asses with Pearson Correlation. One-way ANOVA compared the total score of knowledge, attitude, and perception between sociodemographic variables. The effect of gender, age group, educational level, marital status, occupation, and Latin American region was assessed through binary logistic regression using the total punctuation of the three sections as described above. Statistical analysis was performed through the SPSS software, version 24 (SPSS, Inc., USA) and GraphPad Prism 6 software (San Diego, CA, USA). Results were significant with * $p < 0.05$ and ** $p < 0.01$.

RESULTS

Background characteristics in Latin American participants (Table 2).

The study sample included 600 subjects, the majority of the participants were female (n= 382). We did not find a statistically significant difference between age group (p= 0.565), educational level (p= 0.781), marital status (p= 0.608), occupation (p= 0.067) and Latin American Region (p= 0.958) by gender.

More than 43% of the respondents were between 21 to 30 years old, the majority of participants are from South America (72.2%), graduate (56.8 %), single (59.5%) and professionals (67.2%) with similar percent distribution between males and females.

Knowledge about symptoms and transmission ways in COVID-19 disease (Table 3)

The sample does not discriminate between the most frequent symptoms of the disease and includes other manifestations of the disease. Thus, more than half of the study sample correctly identified the most frequent symptoms like fever (96.5%), fatigue (65.8%), and dry cough (89.2%) along with others as just as sore throat (78.5 %), joint and muscle pain (57.3%). A certain consensus is also observed among the subjects in recognizing as a manifestation of the disease the shortness of breath/shortness of breath (94.8%); However, this has not been confirmed as part of the diagnosis (26). Diarrhea (57.5%), runny nose (57.2%), and nasal congestion (59.7%) were not recognized as part of the disease. The majority of the population (85.3%) knew the incubation period. All the differences between the answers were significant ($p \leq 0.001^{**}$).

Participants correctly reported means of transmission/ spread of COVID-19 including; Touching objects or surfaces that have been in contact with someone who has the virus (93.5%), going to areas/countries affected by COVID-19 (90.5%), shaking hands with someone who has an active case of coronavirus (86.7%). In addition, subjects identified situations unrelated to contagion: participating in blood transfusions (56.2%) and by relating to people who were in a hospital or emergency room (53.7%).

Severity of COVID-19 and prevention measures (Table 4)

The majority of respondents (93%) considered COVID-19 as highly contagious, with symptoms similar to flu and influenza (83.8%). Regarding the mortality ratio, they do not assess that it is worse than influenza or tuberculosis (75.2%) or that it causes permanent physical damage to

patients (78%). However, when comparing the impact of COVID-19 with influenza or the common cold, more than half of the interviewees indicated that the coronavirus would cause a greater impact (74.3%). There is insufficient confidence in the national or local authorities (61.5%) and preparedness for the disease (73.8%).

Poor understanding of the precautionary measures is evident. Although some form of prevention is recognized such as hand washing (99.2%), to have special care with people who have symptoms of COVID-19 (97.8%), to avoid crowded places (97.7%), to separate/ isolate patients with coronavirus (97.7%) and personal hygiene (96.5%). Other important measures were not totally considered, such as checking symptoms on websites ($p=0.683$), despite the fact that the WHO not recommends its use (WHO, 2020a). Furthermore, antibiotics are not recognized as the first line of action against the disease (79.5 %), a sign of the population's knowledge of the treatment. At this time point of the pandemic, there is no vaccine or specific treatment. Draws attention that 28.2% believe it exists.

Perceived susceptibility to COVID-19 (Table 5)

Table 5 shows perception susceptibility, where 60.8% consider that there is a stigma about COVID-19; 69.3% respond to preventive measures to avoid the disease and 50.5% values that the problems derived from the pandemic will not pass quickly compared to the 33.2% who do not know about it. 72.3% of participants believe that get COVID-19 will have serious consequences in their life, 68.7% feels upset about think in the disease, and 50% believe that the situation will not pass quickly.

One of the greatest fear among the evaluated population is being in contact with people who have returned from abroad (68.2%), followed by eating out (65%), visiting hospitals (64.8%) and having contact with people with flu symptoms (56.3%). Concern for medical services personnel is evident (75.2%), considering that one of the groups most susceptible to contagion, follow from people over 60 years of age (66%) and taxi drivers (58.3%). The perception susceptibility to contract disease is 57.7%, and surely 16.5%.

Besides, the different places where people may infect with COVID-19 infection highlight countries affected by COVID- 19 (68.4%) and public transport (58.3%) as places of infectiousness. In addition, the likelihood of having a major outbreak of coronavirus from person to person in my community (50.7%) and the concern that you or your family members will get the virus (45.5%) pose a high-risk susceptibility.

Finally, the perception of treatment efficacy is middle (62.7%); the spread of COVID-19 around the community is relatively high, 50.7%, as well as the concern of family members get sick (45.5%).

Differences in Knowledge, Perception, and Attitude scores between sociodemographic variables

To analyze differences between Knowledge, Perception and Attitude scores and sociodemographic variables, we use one-way ANOVA. Firstly, we compared between regions of Latin America. Figure 2A, evidences significant differences around the perception of susceptibility by region (F: 6.521, $p=0.002^*$). Post-hoc analyses shows that North Americans have reduce score in perception susceptibility compared with South Americans ($p < 0.05$) and Central Americans ($p < 0.01$).

Additionally, marital status reveals differences around the attitude against COVID-19 (F: 3.523, $p= 0.007^*$). Tukey scrutiny exhibits that widowers had lower scores compared with single ($p < 0.05$), and married participants ($p < 0.01^*$). Differently, the perception of COVID-19 susceptibility was different (F: 2.760, $p= 0.027^*$) between singles and cohabitants ($p < 0.05$). Other group do not array differences (see Figure 2B).

Under other variables such as occupation (Figure 2C), we found significant differences in knowledge (F: 3.411, $p= 0.034^*$), Attitude (F: 3.447, $p=0.032^*$), and Perception (F: 11.682, $p < 0.001^{**}$). Independent workers score lower in knowledge compared with professionals ($p < 0.025^*$). Regarding attitude, students score low ($p < 0.043^*$) compared to professionals. Similarly, students score lower compared to independent workers ($p < 0.001^{**}$), as well as professionals ($p < 0.002^*$). Knowledge (F: 3.864, $p= 0.004^*$) is associated to level of instruction. This is the case of postgraduate, who score higher compared to secondary instruction level ($p < 0.042^*$), and technician ($p < 0.013^*$). Finally, to differentiate the perception of susceptibility (F: 3.473, $p= 0.008^*$), postgraduate level displays reduced score compared to high school ($p < 0.008^*$). Other variable does not have differences (Figure 2D).

Distribution of sociodemographic factors associated with Knowledge, Attitude, and Perception of susceptibility in Latin Americans (Table 6)

In Table 6, we show the Odds Ratio regarding sociodemographic variables, as well as binary logistic regression. Younger people (21 to 30 years old) evidenced lower COVID-19 symptoms-related knowledge and transmission compared to adults over 51 years old (OR= 0.396; 95% IC:

0.195 – 0.802; $p < 0.01^*$). The attitude towards the disease (less vs. more positive attitude) is mediated by occupation ($p = 0.041^*$).

Regarding marital status, both married (OR= 2,779; 95% IC: 1.199 – 6.442, $p = 0.017^*$) and singles participants (OR= 2,318; 95% IC: 1.004 – 5.352; $p < 0.05^*$) rate high in positive attitude. Similarly, educational level, occupation, and marital status define the perception of susceptibility among participants. Secondary level instruction is related to increased perception susceptibility (OR= 3,004; 95% IC: 1.005 – 8.979; $p < 0.05$). Compared to widowers (OR= 0.011; 95% IC: 0.001 – 0.174; $p < 0.01$) and student (OR= 0.184; $p < 0.01$) who scored lower in perception susceptibility.

DISCUSSION

This study intended to explore the mechanisms underlying the knowledge, perception and attitude towards COVID-19 among South American population. The spread of the virus in these countries, in addition to the alarming incidence of infected and deceased people place Latin America at the greatest risk worldwide. Although many countries implemented different public health policies, the uneven progression of COVID-19 and the economic impact on this region is promoting the reopening of many countries

At the beginning of the crisis, many of people in Latin America did not fully adhere to government policies; this is especially evident as the rapid increase in the number of people infected despite confinement or social distance (Figure 1). Although Latin America is a multiethnic region, with great socioeconomic, educational and sociological differences, culture and tradition maintain a certain similarity, especially problems linked to corruption, access to public health, and economic informality.

The aforementioned factors may influence the knowledge, attitude, and perception susceptibility among Latin American citizens regarding COVID-19. In our study, 90% of people around Latin America correctly identified fever as the main symptom (96.5%), followed by shortness of breath (94.8%), dry cough (89.2%), and sore throat (78.5%). They also know that the incubation period is between 5 - 14 days (85.3%).

Regarding transmission, touching objects (93.5%), going to areas identified as potentially infected (90.5%), shaking hands with infected people (86.7%), and coughing or sneezing (73.3%) are clearly recognize as transmission ways. Have contact with people previously diagnose with COVID-19 is also a mean identified transmission (78.3%).

Despite knowledge of COVID-19 symptoms and transmission, disease is correctly recognized. Insufficient knowledge might affect people's behavior against protective measures. Some coronavirus-related symptoms are not fully identified, such as diarrhea (57.5%), stomach discomfort (66.5%), or runny nose (57.2%). Being those symptoms, potential feature of other organ infections reported by WHO. People do not recognize coughing or sneezing among others as mean of transmission (24.3%), neither being near someone infected by COVID-19 (23.7%).

Analyzing the attitude against the disease, people fail to full grasp the unknown nature of the virus, they believe that COVID-19 can be cured (69%), have flu-like symptoms or influenza (83.8%), and do not cause permanent physical damage (75.2%). On the other hand, they indicated that is highly contagious (93%), the mortality rate is worse than influenza/flu (75.2%) as well as its impact (74.3%). People who report that their environment is unsafe in hospitals (61.3%) in their community/country having inadequate infection control measures lead participants to consider that their health authorities are not working effectively (61.5%).

Preventive measures are correctly identified incorporating washing hands (99.2%), taking especial care if a person has symptoms of coronavirus (97.8%), avoiding crowded places (97.7%), or staying at home if do not feel well (90.3%). However, all basic measures are not properly recognized as the use of facemasks (58.2%), daily temperature monitoring (57.5%), check their symptoms (49.2%) avoid restaurants/shops (47.2) and have a healthy lifestyle (17.2%). These findings demonstrate that the attitude against COVID-19 is not fully understood and probably not appropriately recognized by the participants.

What is noteworthy to find is more than half of respondents (60.8%) score high in perceived susceptibility, alongside existing stigma (54.8%) related to the coronavirus resulting in fearful attitude and anxiousness of becoming infected. The limiting information lead people to believe that they can stop the risk of catching the disease (69.3%), the disease will not pass quickly (50.5%); predicting serious consequences if someone contracted COVID-19 (72.3%). Among the reasons for concern, contact with people who had just returned from abroad (68.2%) and fear of eating out (65%) were mentioned. Participants also noted that medical service personnel (75.2%), taxi drivers (58.3%) and people over 60 (66%) are the most susceptible to infection.

Finally, the behavioral response of the Latin American population is not sufficient to fight the disease. Misconceptions and insufficient understanding of the disease could explain unsafe behavior. For this reason, several organizations consider them the population most affected by the pandemic.

Limitations

This study has some constraints mainly related to the methodology, whose transversal design restricts the establishment of causal inferences.

Additionally, in relation to the sample, an Internet survey method was used to avoid possible transmission, which made the sampling of our study voluntary and carried out through an online system. Therefore, certain selection bias is considered. Only people who had access to Internet connection were able to participate in the study through computer or mobile phone, limiting the participation of people who did not have such technological devices. In the absence of low-income people, we will have limitations in understanding their responses to the pandemic. Sample size is another limitation, as is the current wave of misinformation in social media that may result in poorer responses (6).

Author Contributions

JZV and RAG make substantial contributions to conception and drafting. JZV and BNC work together in the survey. BNC and JZV work in the analysis and interpretation of data. All authors contribute writing, editing, and reviewing the final manuscript.

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Conflict of Interest Statement

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Table 1. Alpha de Cronbach and correlation between Knowledge, Attitude and Perception scores.

	Cronbach's Alpha	N° of elements	95% Interval Confidence	
	0.839	94	0.82	0.857
	Pearson Correlation	Knowledge (1)	Attitude against COVID-19 (2)	Perception of susceptibility (3)
1	Correlation	1	.137**	0.071
	P value		0.001	0.083
2	Correlation	.137**	1	.137**
	P value	0.001		0.001
3	Correlation	0.071	.137**	1
	P value	0.083	0.001	

Table 2. Sociodemographic characteristics

		Gender			X²	P value
		% Male (n= 218)	% Female (n= 382)	% All (n=600)		
Age group						
	16-20 years	7.3	6.5	6.8		
	21-30 years	40.4	44.8	43.2		
	31-50 years	41.3	40.6	40.8		
	>51 years	11	8.1	9.2	2.035	0.565
Educational level						
	Primary school	0.9	1	1		
	High school	10.6	11.5	11.2		
	technician	13.3	9.9	11.2		
	graduate	55	57.9	56.8		
	postgraduate	20.2	19.6	19.8	1.753	0.781
Marital Status						
	Single	61.5	58.4	59.5		
	Married	23.9	22.8	23.2		
	cohabitating	9.2	12.6	11.3		
	Widower	0.5	1.3	1		
	Diverced	5	5	5	2.706	0.608
Occupation						
	Student	9.6	11.5	10.8		
	Professional	72.9	63.9	67.2		
	Independent	17.4	24.6	22	5.401	0.067
Latin American region						
	South America	71.6	72.5	72.2		
	Central America	7.3	6.8	7		
	North America	21.1	20.7	20.8	0.86	0.958

X²: Chi-square test

Table 3. Knowledge about COVID-19 symptoms and transmission ways

What are the most frequent symptoms of coronavirus (COVID-19)?	Yes	No	I don't know	X²	P value
1.- Fever	96.5	3.2	0.3	1078.03	≤0.001**
2.- Runny nose	29.5	57.2	13.3	176.89	≤0.001**
3.- Sore throat	78.5	13.5	8	553.53	≤0.001**
4.- Joint and muscle pain	57.3	30.5	12.2	185.77	≤0.001**
5.- Shaking chills	33.3	45.2	21.5	50.41	≤0.001**
6.- Shortness of breath / shortness of breath	94.8	2.7	2.5	1021.21	≤0.001**
7.- Diarrhea	28.3	57.5	14.2	175.75	≤0.001**
8.- Fatigue	65.8	22	12.2	293.89	≤0.001**
9.- Dry cough	89.2	6.3	4.5	841.99	≤0.001**
10.- Nasal congestion	24.5	59.7	15.8	193.99	≤0.001**
11.- Weightloss	6.2	70.5	23.3	399.49	≤0.001**
12.- Stomach discomfort	13.7	66.5	19.8	300.43	≤0.001**
13.- Difficulty to sleep	15.2	61.7	23.2	222.51	≤0.001**
14.- Incubation period is 5–14 days	85.3	7.7	7	730.12	≤0.001**
Which of the following situations are means of transmission / spread of coronavirus (COVID-19)?					
1.- Coughing or sneezing near people infected with the coronavirus (COVID-19)	73.3	24.3	2.3	475.56	≤0.001**
2.- Go to areas / countries affected by coronavirus (COVID-19)	90.5	8	1.5	886.17	≤0.001**
3.- Touching objects or surfaces that have been in contact with someone who has the virus	93.5	3.3	3.2	977.41	≤0.001**
4.- Shake hands with someone who has an active case of coronavirus (COVID-19)	86.7	9	4.3	769.96	≤0.001**
5.- Being on the same plane with someone with coronavirus (COVID-19)	68.2	23.7	8.2	349.23	≤0.001**
6.- Eating food prepared by someone infected or exposed to the coronavirus (COVID-19)	65.8	20.7	13.5	289.81	≤0.001**
7.- Participate in blood transfusions	19.3	56.2	24.5	143.17	≤0.001**
8.- By relating to people who were in a hospital or emergency room	33	53.7	13.3	146.44	≤0.001**
9.- Relating to cases identified by doctors	78.3	14.2	7.5	550.75	≤0.001**
10.- For relating to cases identified during evaluations at entry points to my country	72.2	16	11.8	408.73	≤0.001**

a: Statistically significant difference ($P < 0.001^{**}$), X^2 square test.

Table 4. Severity of COVID-19 and prevention measures

Severity of the coronavirus (COVID-19). The coronavirus:	Agree	Not sure / Maybe	Disagree	X^2	P value
1.- It can be cured	69	-----	31	86.64	$\leq 0.001^{**}$
2.- It is highly contagious	93	-----	7	443.76	$\leq 0.001^{**}$
3.- Coronavirus mortality rate is worse than influenza or tuberculosis	24.8	-----	75.2	152.01	$\leq 0.001^{**}$
4.- COVID-19 causes permanent physical damage to patients	22	-----	78	188.16	$\leq 0.001^{**}$
5.- You have symptoms similar to common flu and influenza	83.8	-----	16.2	274.72	$\leq 0.001^{**}$
6.- My community / country does not have a coronavirus vaccine	71.8	-----	28.2	114.40	$\leq 0.001^{**}$
7.- My community / country does not have adequate medicine or treatment for the disease	48.7	-----	51.3	0.42	0.514
8.- Hospitals in my community / country have not taken adequate infection control measures	38.7	-----	61.3	30.82	$\leq 0.001^{**}$
9.- Coronavirus impact is worse compared to influenza or common flu	74.3	-----	25.7	142.10	$\leq 0.001^{**}$
10.- The authorities of my country are prepared to face the disease	26.2	-----	73.8	136.32	$\leq 0.001^{**}$
11.- The response of the health authorities of my country / community is effective	38.3	0.2	61.5	345.31	$\leq 0.001^{**}$
Knowledge about contagion prevention / precaution measures					
1.- Washing hands vigorously (soap / water) for 20 seconds helps prevent / transmit disease	99.2	-----	0.8	580.16	$\leq 0.001^{**}$
2.- Special care should be (COVID-19) in my community.	97.8	-----	2.2	549.12	$\leq 0.001^{**}$
3.- Personal hygiene	96.5	-----	3.5	518.94	$\leq 0.001^{**}$
4.- Healthy life style	82.8	-----	17.2	258.72	$\leq 0.001^{**}$
5.- Daily temperature monitoring	57.5	-----	42.5	13.50	$\leq 0.001^{**}$
6.- Avoid traveling abroad.	92.8	-----	7.2	440.32	$\leq 0.001^{**}$
7.-Use of face mask	58.2	-----	41.8	16.01	$\leq 0.001^{**}$
8.- Clean environment	91.8	-----	8.2	420.01	$\leq 0.001^{**}$
9.- Stay home if it's not okay	90.3	-----	9.7	390.42	$\leq 0.001^{**}$
10.- Seek medical attention if not okay	89.3	-----	10.7	371.30	$\leq 0.001^{**}$
11.- Avoid crowded places	97.7	-----	2.3	545.30	$\leq 0.001^{**}$
12.- Separation / isolation of patients with coronavirus (COVID-19)	97.7	-----	2.3	545.30	$\leq 0.001^{**}$
13.- Sending passengers with coronavirus symptoms (COVID-19) to a hospital or referral center for examination	79.8	-----	20.2	213.60	$\leq 0.001^{**}$
14.- You used a disinfectant at home or at work.	92.8	-----	7.2	440.32	$\leq 0.001^{**}$
15.- Check symptoms on websites	49.2	-----	50.8	0.16	0.683
16.- Wore something to clean objects that may have come in contact with someone with coronavirus (COVID-19)	81.7	-----	18.3	240.66	$\leq 0.001^{**}$
17.- Avoid restaurants or shops	47.2	-----	52.8	1.92	0.165

18.- Cancel appointments in hospitals or doctor's offices	54.8	-----	45.2	5.60	0.018*
19.- Avoid public transportation	85.7	-----	14.3	305.30	≤0.001**
20.- Antibiotics are the first-line treatment for the management of coronavirus (COVID-19)	20.5	-----	79.5	208.86	≤0.001**
21.- Preparation of raw meats and other foods with different knives	26.3	-----	73.7	134.42	≤0.001**

a: Statistically significant difference ($P<0.001^{**}$), X^2 square test.

Table 5. Perceived susceptibility to COVID-19

Perception and perceived susceptibility or response	Yes	No	I don't know	X²	P value
1.- Do you think there is a stigma related to the coronavirus (COVID-19)	60.8	23	16.2	208.39	≤0.001**
2.- Thinking that I could become infected with coronavirus (COVID-19) makes me nervous / anxious	54.8	40	5.2	234.01	≤0.001**
3.- Nothing I do can stop the risk of catching me	16.2	69.3	14.5	350.17	≤0.001**
4.- If I contracted the coronavirus (COVID-19), it will have serious consequences for me or my relatives	72.3	18.5	9.2	418.51	≤0.001**
5.- I get upset when I think about the coronavirus (COVID-19)	24.7	68.7	6.7	366.24	≤0.001**
6.- Coronavirus (COVID-19) problems will pass quickly	16.3	50.5	33.2	105.07	≤0.001**
Are you afraid of:					
1.- Fear of being in contact with people with flu symptoms (e.g. cough, runny nose, sneezing, fever)	56.3	35.5	8.2	210.07	≤0.001**
2.- Fear of eating out (for example, street vendor centers, food courts)	65	30.2	4.8	328.51	≤0.001**
3.- Fear of being in contact with people who have just returned from abroad	68.2	26	5.8	364.21	≤0.001**
4.- Fear of visiting hospitals	64.8	29.8	5.3	321.93	≤0.001**
Perceived susceptibility to coronavirus infection (COVID-19), Evaluate the possibility of contracting the disease:	Very likely	Probable	Unlikely		
1.- Oneself	16.5	57.7	25.8	167.71	≤0.001**
2.- My relatives	20.5	68.7	10.8	345.49	≤0.001**
3.- People over 60 years	66	31.2	2.8	360.37	≤0.001**
4.- Adults	37.5	59.7	2.8	295.39	≤0.001**
5.- Children	21	61	18	207.48	≤0.001**
6.- Medical services personnel	75.2	22.7	2.2	510.33	≤0.001**
7.- Food vendors	45.7	49.3	5	217.96	≤0.001**
8.- Food handlers	40.7	53.2	6.2	213.33	≤0.001**
9.- General public	40.3	57.2	2.5	282.19	≤0.001**
10.- Taxi drivers	58.3	38.7	3	283.24	≤0.001**
Where are people likely to get coronavirus (COVID-19)?					
1.- Home	2.3	41.3	56.3	279.72	≤0.001**
2.- Health institutions	46.7	32.8	20.5	61.69	≤0.001**
3.- Public transport	58.3	20.2	21.5	168.91	≤0.001**
4.- Markets or shops	50	33.2	16.8	99.01	≤0.001**
5.- Countries affected by the coronavirus (COVID-19)	63.2	14.2	22.7	246.81	≤0.001**
What do you think the percentage of:	High	Middle	Low		
1.- Efficacy of treatments for coronavirus (COVID-19)	20.8	62.7	16.5	234.01	≤0.001**
2.- Likelihood of having a major outbreak of coronavirus (COVID-19) from person to person in my community	50.7	39.7	9.7	162.12	≤0.001**
3.- Concern that you or your family members will get the virus	45.5	42.3	12.2	121.87	≤0.001**
4.- Having effective medications or remedies available	19.3	50.3	30.3	88.92	≤0.001**

a: Statistically significant difference ($P < 0.001^{**}$), X^2 square test

Table 6. Distribution of sociodemographic variables associated with Knowledge, Attitude and Perception of susceptibility in Latin Americans

Sociodemographic Variables	Knowledge							Attitudes							Perception of susceptibility									
	Less accurate		More accurate		χ^2 <i>p-value</i>	OR	95% CI	<i>p-value</i>	Less positive		More positive		χ^2 <i>p-value</i>	OR	95% CI	<i>p-value</i>	Less frequent		More frequent		χ^2 <i>p-value</i>	OR	95% CI	<i>p-value</i>
	N	(%)	N	(%)					N	(%)	N	(%)					N	(%)	N	(%)				
Gender																								
Male	118	51.4	100	45.9	0.495 ^a 0.270	1.129	0.776 – 1.547	0.603	60	27.5	158	72.5	0.514 ^a 0.261	1.102	0.754 – 1.610	0.615	41	39.4	177	81.2	0.502 0.270	0.823	0.521 – 1.301	0.405
Female	218	57.1	164	42.9		1			116	30.4	266	69.6		1			63	60.6	319	83.5		1		
Range of Age																								
16-20	22	53.7	19	46.3	7.194 0.066	0.544	0.212 – 1.401	0.207	11	26.8	30	73.2	0.820 0.845	1.324	0.463 – 3.792	0.601	8	19.5	33	80.5	1.272 0.736	0.785	0.201 – 3.060	0.727
21-30	160	61.8	99	38.2		0.396	0.195 – 0.802	0.010*	72	27.8	187	72.2		1.175	0.545 – 2.536	0.680	48	18.5	211	81.5		0.751	0.255 – 2.211	0.603
31-50	129	52.7	116	47.3		0.635	0.334 – 1.205	0.165	76	31	169	69		0.881	0.439 – 1.767	0.721	41	16.7	204	83.3		0.605	0.224 – 1.637	0.322
>51	25	45.5	30	54.5		1			17	30.9	38	69.1		1			7	12.7	48	87.3		1		
Education																								
Primary	4	66.7	2	33.3	7.929 0.094	0.517	0.086 – 3.115	0.471	2	33.3	4	66.7	2.837 0.585	1.008	0.161 – 6.312	0.993	0	0	6	100	6.676 0.154	>33		0.999
High School	42	62.7	25	37.3		0.679	0.349 – 1.322	0.255	24	35.8	43	64.2		0.737	0.360 – 1.509	0.404	6	9	61	91		3.004	1.005 – 8.979	0.049*
Technician	46	68.7	21	31.3		0.522	0.269 – 1.015	0.056	22	32.8	45	67.2		0.761	0.377 – 1.540	0.448	10	14.9	57	85.1		1.269	0.528 – 3.048	0.594
Graduate	184	54	157	46		1.003	0.637 – 1.580	0.989	98	28.7	243	71.3		0.857	0.511 – 1.438	0.559	62	18.2	279	81.8		1.290	0.721 – 2.307	0.392
Postgraduate	60	50.4	59	49.6		1			30	25.2	89	74.8		1			26	21.8	93	78.2		1		
Marital status																								
Single	203	56.9	154	43.1	2.456 0.652	1.842	0.782 – 4.341	0.162	97	27.2	260	72.8	11.076 0.026*	2.318	1.004 – 5.352	0.049*	68	19	289	81	9.852 0.043*	0.165	0.021 – 1.311	0.088
Married	71	51.1	68	48.9		1.839	0.786 – 4.305	0.160	35	25.2	104	74.8		2.779	1.199 – 6.442	0.017*	22	15.8	117	84.2		0.172	0.022 – 1.367	0.096
Cohabitating	39	57.4	29	42.6		1.938	0.753 – 4.993	0.170	27	39.7	41	60.3		1.443	0.574 – 3.626	0.436	10	14.7	58	85.3		0.168	0.020 – 1.442	0.104
Widower	4	66.7	2	33.3		1	1.37 – 7.278	1	3	50	3	50		1.178	0.185 – 7.519	0.862	3	50	3	50		0.011	0.001 – 0.174	0.001**
Divorced	19	63.3	11	36.7		1			14	46.7	16	53.3		1			1	3.3	29	96.7		1		
Occupation																								
Student	37	56.9	28	43.1	3.501 0.174	1.408	0.706 – 2.811	0.332	24	36.9	41	63.1	6.402 0.041*	0.744	0.362 – 1.531	0.422	22	33.8	43	66.2	18.628 ≤0.001**	0.184	0.074 – 0.458	≤0.001**
Professional	216	53.6	187	46.4		1.271	0.811 – 1.993	0.295	105	26.1	298	73.9		1.385	0.863 – 2.222	0.178	70	17.4	333	82.6		0.504	0.243 – 1.043	0.065
Independent	83	62.9	49	37.1		1			47	35.6	85	64.4		1			12	9.1	120	90.9		1		
Latin American Region																								
South America	242	55.9	191	44.1	0.355 0.837	1.108	0.730 – 1.681	0.631	127	29.3	306	70.7	0.016 0.992	1.003	0.639 – 1.576	0.989	71	16.4	362	83.6	3.368 0.186	1.446	0.860 – 2.431	0.164
Central America	22	52.4	20	47.6		1.264	0.611 – 2.613	0.528	12	28.6	30	71.4		1.029	0.462 – 2.292	0.944	5	11.9	37	88.1		1.890	0.638 – 5.597	0.250
North America	72	57.6	53	42.4					37	29.6	88	70.4		1			28	22.4	97	77.6		1		

a: Statistically significant difference ($P < 0.001^{**}$), Binary logistic regression

Figure 1. Total death (A) and people infected (B) in Latin American countries through days of lockdown. Last actualization date: May 31.

Figure 2. Comparison between Knowledge, attitude, and perception of vulnerability against COVID-19 and sociodemographic variables, by Latin American (A), marital status (B), occupation (C) and educational level (D).