

Willingness to receive COVID-19 vaccination in people living with HIV/AIDS from Latin America

Yeimer Ortiz-Martínez^{1,2} , Miguel Ángel López-López³, Carlos E Ruiz-González¹, Valentina Turbay-Caballero⁴, Daniel H Sacoto^{5,6}, Marcela Caldera-Caballero², Heyman Bravo², Jheinner Sarmiento² and Alfonso J Rodríguez-Morales⁷

Abstract

Background: Prior research has established some risk factors for an increased risk of severe disease and mortality from coronavirus disease 2019 (COVID-19). However, the impact of HIV infection on SARS-CoV-2 susceptibility and severity is a significant gap in the literature. In the same way, not many studies across the globe have analyzed the degree of vaccination willingness among people living with HIV/AIDS (PLWHA) and considerations regarding prioritizing this population during vaccination plans, particularly in developing countries.

Methods: A descriptive-analytical cross-sectional study was conducted. Self-completed electronic surveys directed to PLWHA were performed via Twitter in February 2021, using accounts of HIV activists.

Results: 460 (87.1%) participants were willing to be vaccinated with any COVID-19 vaccine. The reasons for that were listed as 1) the belief that vaccination prevents both the COVID-19 infection (81.3%) as well as being a spreader (52.2%); 2) having a high occupational risk of becoming infected with COVID-19 (22%); and 3) the belief that they would be at high risk of death because of COVID-19 (21.3%). Only 56 (10.6%) participants expressed hesitancy toward vaccination, and 12 (2.2%) stated they did not want to get vaccinated.

Conclusions: Our results may support the prioritization of people living with HIV during the implementation of vaccination plans in developing countries. New strategies should be adopted to overcome the hesitancy and unwillingness toward the COVID-19 vaccination, especially in populations with risk factors for severe disease.

Keywords

Coronavirus disease 2019, people Living with human immunodeficiency virus/AIDS, coronavirus disease 2019 vaccine, vaccine willingness, vaccine hesitancy, vaccine unwillingness

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Introduction

During the last few years, the coronavirus disease 2019 (COVID-19) has made more evident the breaches in our society and the risks faced by minority groups or vulnerable populations.¹ By the end of April 2021, according to the World Health Organization and the John Hopkins University Coronavirus Resource Center, the number of confirmed cases of COVID-19 exceeded 247 million, with more than 3.1 million deaths registered globally.^{2,3} The Americas region was on top of the list with around 42% of the total cumulative cases and 48% of the total cumulative deaths. Vaccination programs have been implemented in most countries, but unfortunately, with many disparities in

¹ Department of Internal Medicine, Universidad Industrial de Santander, Bucaramanga, Colombia

² Faculty of Health Sciences, Universidad de Sucre, Sincelejo, Colombia

³ Fundación "MásQueTresLetras", Medellín, Colombia

⁴ Faculty of Health Sciences, Universidad del Norte, Barranquilla, Colombia

⁵ Faculty of Health Sciences, Universidad del Azuay, Cuenca, Azuay, Ecuador

⁶ Mayo Clinic, Rochester, MN, USA

⁷ Grupo de Investigación Biomedicina, Faculty of Medicine, Fundación Universitaria Autónoma de las Américas, Pereira, Colombia

Corresponding author:

Yeimer Ortiz-Martínez, Department of internal medicine, Universidad Industrial de Santander Facultad de Salud, Calle 18 32 06 San alonso, Bucaramanga 380002, Colombia.

Email: Yeimer10@hotmail.com

the availability and speed of immunization between the different regions of the world.^{4,5}

People living with HIV/AIDS (PLWHA) have an increased risk and prevalence of chronic comorbidities as chronic kidney disease, cardiovascular disease, dyslipidemia, hepatitis C and B, and anemia in comparison with the non-HIV population.⁶ In addition, inflammation associated with the disease and antiretroviral therapy (ART) has been established as a risk factor for the development of metabolic derangements as diabetes mellitus in PLWH.⁷ Prior research has found that older age and underlying comorbidities such as cancer, chronic kidney disease, chronic heart failure, chronic pulmonary disease, diabetes mellitus, hypertension, and obesity increased the risk of mortality from COVID-19.^{8–12} Nevertheless, the impact of the human immunodeficiency virus (HIV) infection on SARS-CoV-2 susceptibility and severity is a significant gap in the literature.¹³

People living with HIV/AIDS are becoming increasingly concerned that the immunosuppressive nature of HIV (abnormal humoral and T-cell-mediated immune responses) may make them more vulnerable to SARS-CoV-2 infection and more likely to experience a severe presentation.^{13–16} According to this logic, PLWHA with a low CD4 cell count, advanced disease, a high viral load, or not on ART should be treated with extreme caution. A recent report found poorer COVID-related outcomes (higher rates of severe disease requiring hospitalization) in HIV patients than those without an HIV diagnosis, especially those with multimorbidity and older age.¹⁷

Considering those above, for every person living with HIV, the National Institutes of Health recommends that CDC's SARS-CoV-2 prevention measures, including social distancing and mask-wearing, should be followed.¹⁸ Additionally, this population should receive COVID-19 vaccination regardless of CD4 cell count or viral load. Despite this, in many countries, especially in developing ones, they are not prioritized in the vaccination process. A study conducted among Black Americans living with HIV reported high support rates for general beliefs and mistrust of COVID-19 and its vaccine.¹⁹

Previous studies have reported a general vaccine hesitancy as a common problem among the population.^{20,21} It has been established that the attitude toward vaccination has a regional variability component. Higher-income regions including North America and North Europe agree that vaccines are safe in 72–73%.^{21,22} Regarding COVID-19 vaccination, the common reasons for hesitancy found in recently published data are as follows: the perceived safety,²³ religious beliefs,²⁴ and negative attitudes toward vaccines, including general mistrust and concerns about future side effects.^{25–27}

Even though the hesitancy toward COVID-19 vaccination has been assessed thoroughly,²² the willingness to receive COVID-19 vaccination among PLWHA remains

unknown. Since the current pandemic is not showing signs of decline, it is still considered a matter of public health. In addition, despite efforts toward the development of COVID-19 vaccines being made, the hesitancy and unwillingness to receive it are still considered a significant hindrance.²⁸ Therefore, it is imperative to analyze and negative attitudes toward vaccines including general mistrust and concerns about future side effects in human factors including willingness to vaccination among underrepresented populations as PLWHA.

The present is a cross-sectional study aimed to investigate the willingness to receive a vaccine against COVID-19 within PLWHA and to detect the potential factors influencing their decision to provide evidence for specific recommendations and explore the possibility of scaling up immunization programs.

Materials and methods

A descriptive-analytical cross-sectional study was carried out. Recruitment of participants was performed through Twitter social media accounts of HIV activists from the “MasQueTresLetras” foundation. The foundation offers free counseling to HIV patients and generates HIV educational digital content directed to PLWHA from different countries. A self-completed electronic survey was built using the Google forms platform and was shared via HIV activist's Twitter accounts to PLWHA between February and May 2021.

The survey development process included information adapted from previously used and published surveys, including questions regarding COVID-19 vaccine²⁶ and HIV information.²⁹ A pilot survey was tested on 10 HIV-positive participants to ensure readability and understanding. The surveys were reviewed only by the leading researcher. The following information was requested: (1) gender; (2) age; (3) place of residence; (4) whether having a chronic condition (for example, hypertension, hyperlipidemia, diabetes, among others; not including COVID-19 infection); (5) influenza vaccination in the past year; (6) previous SARS-CoV-2 infection; (7) number of years since HIV diagnosis; (8) current ART treatment status; (9) last HIV viral load; (10) last result of CD4 cell count; (11) willingness to receive a SARS-CoV-2 vaccine; and (12) reasons for a previous answer (multiple answers). Regarding comorbidities, it was directed as a general question, without enquiring about any previous specific comorbidity.

Once the survey was voluntarily self-completed, the participants' information was uploaded into an Excel file. Only the leading researcher of the study and the data analyst had access. A descriptive analysis was initially performed for the statistical analysis, where the categorical values are presented as proportions and the continuous variables as means and standard deviation (SD). The association

Table 1. Willingness to receive COVID-19 vaccination according to sociodemographic characteristics and medical history.

		Total n = 528	Willing n = 460 (87.12%)	Unsure n = 56 (10.61%)	Not willing n = 12 (2.27%)	p-value
Sex	Female	18 (3.41%)	15 (83.33%)	3 (16.67%)	0 (0%)	0.468
	Male	506 (95.83%)	442 (87.35%)	52 (10.28%)	12 (2.37%)	
	Other	4 (0.76%)	3 (75%)	1 (25%)	0 (0%)	
Age	Median	30 (IQR 27-36)	30 (IQR 27-36)	30 (IQR 27-37.5)	33 (IQR 27.5-39)	0.711
	≤27 years	153 (28.98%)	135 (88.24%)	15 (9.8%)	3 (1.96%)	
	28-30 years	120 (22.73%)	105 (87.5%)	14 (11.67%)	1 (0.83%)	
	31-36 years	128 (24.24%)	112 (87.5%)	11 (8.59%)	5 (3.91%)	
	>36 years	127 (24.05%)	108 (85.04%)	16 (12.6%)	3 (2.36%)	
Residence	Urban	496 (93.94%)	433 (87.3%)	52 (10.48%)	11 (2.22%)	0.620
	Rural	32 (6.06%)	27 (84.38%)	4 (12.50%)	1 (3.13%)	
Comorbidity	Yes	67 (12.69%)	56 (83.58%)	9 (13.43%)	2 (2.99%)	0.555
	No	461 (87.31%)	404 (87.64%)	47 (10.20%)	10 (2.17%)	
Influenza vaccination in the last year	Yes	365 (69.13%)	326 (89.32%)	34 (9.32%)	5 (1.37%)	0.037
	No	147 (27.84%)	122 (82.99%)	18 (12.24%)	7 (4.76%)	
	Do not remember	16 (3.03%)	12 (75%)	4 (25%)	0 (0%)	
COVID-19 history	Yes	78 (14.77%)	68 (87.18%)	8 (10.26%)	2 (2.56%)	0.952
	No	450 (85.23%)	392 (87.11%)	48 (10.67%)	10 (2.22%)	

between the dependent and independent variables in this study was evaluated using binomial regression models with their corresponding goodness of fit evaluation. The significance level was set at <0.05. All data were analyzed using STATA[®] version 14.0 statistical software (STATA Corporation, College Station, TX, USA).

The research was carried out following the Helsinki Declaration. The planning and execution of this study adhered to the ethical standards of autonomy, right, beneficence, and non-maleficence. The ethical methods outlined in the Colombian Ministry of Health's code of medical ethics (Law 23 of 1981) and resolution 8430 of 1993, which establish the criteria for health research they participate in, were followed. The ethical committee approved the study of Universidad de Sucre following the current legislation. Implied consent was used rather than formal written consent to maintain the anonymity of participants. The participants clicked the "I agree" button before commencing the survey to indicate their consent.

Results

A total of 528 surveys were completed and analyzed. Overall, 506 were male (95.83%), 18 were female (3.41%), and four were transgender (0.76%), and the average age was 30 years (IQR 27-36). Most participants were living in Colombia (81.63%), followed by Mexico (11.74%), Chile (1.33%), Peru (1.33%), Ecuador (0.95%), and others (4.35%); 496 (93.94%) were living in an urban area.

Regarding the characteristics related to HIV infection, the majority was diagnosed within the previous 5 years (56.4%), followed by in less than 1 year (18.5%); 97.1%

were on ART at the time of the study; 83.5% had an undetectable viral load in their last result, and 46.5% had a CD4 cell count greater than 500 cells. Additionally, 12.6% reported suffering from a chronic condition other than HIV infection, 69.1% reported being vaccinated against Influenza in the last year, and only 14.7% reported previous SARS-CoV-2 infection. The surveyed population's characteristics are summarized in [Table 1](#).

Overall, 460 (87.1%) of 528 participants stated that they were willing to be vaccinated with any COVID-19 vaccine. Another 56 (10.6%) stated that they were not sure, and only 12 (2.2%) stated that they did not want to get vaccinated. As shown in [Table 1](#), we found considerable differences in the willingness to get vaccinated only across the influenza vaccination history in the past year ($p = 0.037$).

As shown in [Table 2](#), there were no statistically significant differences relating to the willingness to be vaccinated against COVID-19 and the characteristics of the HIV infection.

The main reason for being willing to receive the COVID-19 vaccine ([Figure 1](#)) was the belief that vaccination prevents both the COVID-19 infection ($n = 374$; 81.3%) as well as being a spreader ($n = 240$; 52.2%). Also, 101 participants (22%) mentioned having a high occupational risk of becoming infected with COVID-19 as one reason, while 98 (21.3%) believed they would be at high risk of death because of COVID-19.

Among participants who were hesitating about getting vaccinated against COVID-19, the main reason for this was the concern about potential side effects from the vaccine ($n = 46$; 82.1%) and the belief that the vaccine may not be safe enough ($n = 10$; 17.9%) ([Figure 2](#)).

Table 2. Willingness to receive COVID-19 vaccination according to characteristics of HIV infection.

		Total n = 528	Willing n = 460 (87.12%)	Unsure n = 56 (10.61%)	Not willing n = 12 (2.27%)	p-value
Years since HIV diagnosis	<1 year	98 (18.56%)	88 (89.80%)	8 (8.16%)	2 (2.04%)	0.685
	1–5 years	298 (56.44%)	256 (85.91%)	36 (12.08%)	6 (2.01%)	
	5–10 years	68 (12.88%)	62 (91.18%)	5 (7.35%)	1 (1.47%)	
	>10 years	64 (12.12%)	54 (84.38%)	7 (10.94%)	3 (4.69%)	
Treatment for HIV	Yes	513 (97.16%)	447 (87.13%)	55 (10.72%)	11 (2.14%)	0.343
	No	15 (2.84%)	13 (86.67%)	1 (6.67%)	1 (6.67%)	
Last viral load	Undetectable	441 (83.52%)	383 (86.85%)	48 (10.88%)	10 (2.27%)	0.955
	<1000 copies	34 (6.44%)	30 (88.24%)	3 (8.82%)	1 (2.94%)	
	1000–100000 copies	13 (2.46%)	12 (92.31%)	1 (7.69%)	0 (0%)	
	>100000 copies	6 (1.14%)	5 (83.33%)	1 (16.67%)	0 (0%)	
	Not known	34 (6.44%)	30 (88.24%)	3 (8.82%)	1 (2.94%)	
Last CD4 lymphocyte count	<50 cells	28 (5.30%)	25 (89.29%)	2 (7.14%)	1 (3.57%)	0.768
	50–200 cells	33 (6.25%)	29 (87.88%)	4 (12.12%)	0 (0%)	
	201–500 cells	134 (25.38%)	114 (85.07%)	17 (12.69%)	3 (2.24%)	
	>500 cells	246 (46.59%)	218 (88.62%)	24 (9.76%)	4 (1.63%)	
	Not known	87 (16.48%)	74 (85.06%)	9 (10.34%)	4 (4.6%)	

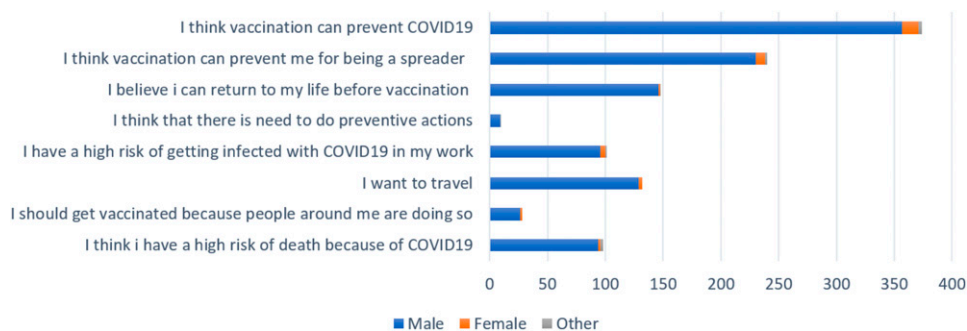


Figure 1. Reasons for wanting to get vaccinated against COVID-19 (n = 460, multiple answers).

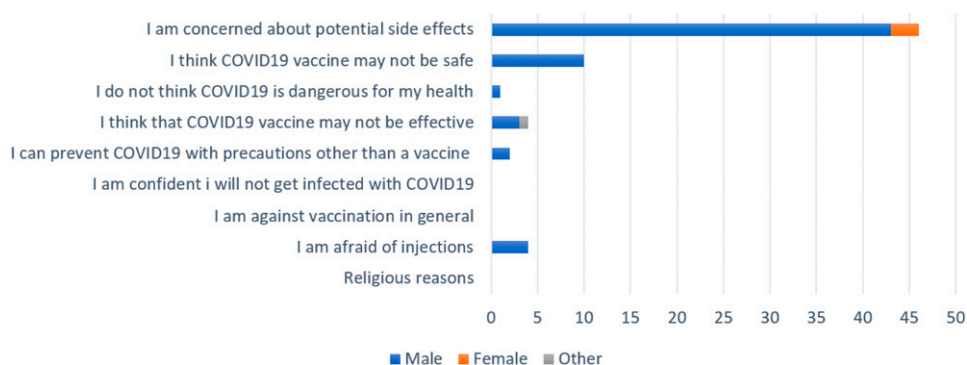


Figure 2. Reasons for hesitating to get vaccinated against COVID-19 (n = 56, multiple answers).

The reasons for not being vaccinated were similar to those of the previous group. The most relevant ones were concerns about potential side effects from the vaccine (n = 8; 66.7%) and low confidence about the vaccine’s effectiveness (n = 4; 33.3%) (Figure 3).

Discussion

To the best of our knowledge and belief, this is the first study conducted to investigate the willingness to receive a vaccine against COVID-19 and its associated factors in PLWHA in

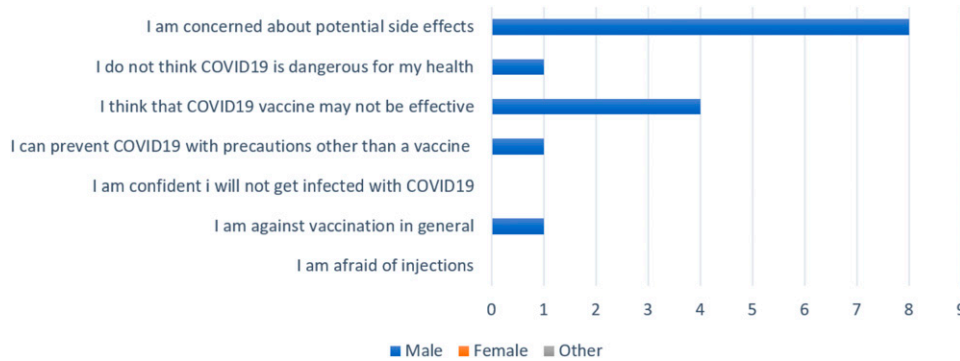


Figure 3. Reasons for not wanting to be vaccinated against COVID-19 ($n = 12$, multiple answers).

Latin America, and is one of the first worldwide. More than 85% of participants were willing to be vaccinated within our sample.

The results found in this study showed an increased willingness compared to what has been reported in other countries including Japan with 65.7%,²⁶ France with 30%,³⁰ Ireland with 35% and United Kingdom with 31%³¹, and Portugal with 56%.³² This is probably related to the residency of the sample population. Yoda et al.²⁶ involved participants mostly from rural areas where access to healthcare and information can be limited. In contrast, our population mainly was from urban areas and therefore had more accessible access to healthcare-related information, therefore explaining the possibility of higher willingness of vaccination. Furthermore, Solis Arce et al.³³ studied COVID-19 acceptance and hesitancy among 15 low- and middle-income countries (Burkina Faso, Mozambique, Rwanda, Sierra Leone and Uganda, India, Nepal, Nigeria, Pakistan, Colombia, among others). They found that the average acceptance rate across the complete set of studies was 80.3%, similar to our results.

The tendency toward willingness to be vaccinated was widespread across the sample. It did not significantly vary by most sociodemographic characteristics or other variables, which is, in fact, a great result, given the overall levels of misinformation and fear resulting in hesitancy and reluctance across the globe, as demonstrated in other studies.^{19,26,30} Our participants reported that the main reason for being vaccinated is the belief that vaccination prevents not only the COVID-19 infection but also decreases the chances of being a spreader. Additionally, some of them highlighted having a high occupational risk of becoming infected with COVID-19 as one of the reasons, and the belief of being at high risk of death because of COVID-19. This tendency to be vaccinated involving the interest toward personal protection against COVID-19 has been shown in previous studies.³³

The reasons for both hesitancy and unwillingness to get vaccinated found among the participants were directly related to the vaccine's potential side effects and

effectiveness. These results are similar to those reported in the literature. Almost two-thirds of 1100 participants from Japan who responded to a survey about willingness to receive the COVID-19 vaccine reported side effects and safety concerns about the vaccine as the significant elements of hesitancy.²⁶ Similarly, a meta-analysis showed side effects as the primary concern among 15 low- and middle-income countries.³⁴ This concern has been explained in part due to the spread of misinformation³⁵ as well as some mistrust of the public health system¹

Among other reasons for hesitancy were those primarily associated with specific characteristics of the participants: fear about COVID-19 infection and health, willingness to make COVID-19 vaccination mandatory, and being a patient with a chronic disease.³⁰

Interestingly, there was a significant association between influenza vaccination history and the willingness to be vaccinated against COVID-19. There was a similar trend of low percentage among those who did not receive the influenza vaccine (27.84%) and were not willing to receive the COVID-19 vaccine (12.9%). This association of decreased willingness to be vaccinated against COVID-19 among those who had no intention to take the influenza vaccine has been previously described as well³²

Despite representing a minor percentage, PLWHA still represent a vulnerable population at a higher risk of getting infected with COVID-19 and developing complications.³⁶ Additionally, vaccine hesitancy may lead to a delay or refusal of vaccination despite available services. Therefore, threatening the success of COVID-19 vaccination programs among this population. Thus, a healthcare system response to address vaccine hesitancy is critical. Rutten et al. reviewed the evidence-based strategies that can be implemented to address COVID-19 vaccine hesitancy. They have encouraged interpersonal, individual-level, and organizational interventions within clinical organizations to address this critical gap and improve population adoption of COVID-19 vaccination.³⁷

It is essential to highlight that our participants mainly were of Latin American origin, which may be an essential

factor as it was demonstrated in a recent study that 8 out of 10 adults in Latin America and the Caribbean have vaccination intention, as well as fear of adverse effects.³⁸ On the other hand, our sample was primarily males, and critically, many other studies have demonstrated a tendency of female participants to be hesitant/reluctant to receive any COVID-19 vaccine.^{38–40} Additionally, Bogart et al.¹⁹ found that participants with less than high school education showed higher levels of general COVID-19 mistrust, therefore a lower willingness to get a future vaccine. Consequently, further research regarding the educational background among PLWHA would be helpful to determine if this particular factor could be counted as an essential contributor to the unwillingness for the COVID-19 vaccine in PLWHA.

Healthcare workers play an essential role when it comes to patient education. Based on scientific information, they have the capacity to guide the patient toward the best next step in terms of preventive measures, diagnosis, and treatment and provide answers to any concerns or misunderstandings about those. A study related to the hesitancy among Black Americans living with HIV found that health care and social service providers are more trusted than other sources of information (government, social media) about the COVID-19 pandemic.⁴¹ Thus, in order to decrease levels of hesitancy and unwillingness toward COVID-19 vaccination among PLWHA, we propose to conduct an approach over the policies that may help to improve provider-led interventions to address reasons for COVID-19 vaccination unwillingness and hesitancy, addressing specific concerns regarding common side effects, how to mitigate them, when to expect them, as well as providing scientific but understandable information regarding the different types of vaccines and their efficacy.

One way to implement this approach is to train healthcare providers on structural competency and use motivational interviewing skills.⁴² The aim would be to acknowledge any mistrust regarding the COVID-19 vaccine, moving forward to addressing side effects and efficacy, in a non-confrontational and non-judgmental way, following pre-intervention research.⁴³

An alternative approach could encourage healthcare workers to engage with the community. In the particular case of Latin America, where most of our population came from, where sometimes the healthcare system gets overcrowded and is difficult to access, having trained community-based outreach workers who know the local community could be a good starting point. These measures have been proved to be effective in models run in the United States of America, Europe, and Australia, as the one implemented for drug users with HIV to decrease the risk in their neighborhoods.⁴⁴ They would know where, when, and how to access and engage hidden populations in the process of establishing trust and reducing risk, as well as providing accurate information.

Although the COVID-19 pandemic has affected medical care and the supply of medicines to patients with chronic conditions, including HIV/AIDS,⁹ the majority of the participants in our sample had an undetectable viral load, and about half had a CD4 cell count above 500, which is probably related to high ART adherence and a high compromise with their chronic condition. Therefore, this could be related to the high intention to vaccinate observed in this study. Accordingly, it was recently reported that lower ART adherence is related to less willingness and high hesitancy to receive treatment or vaccination against COVID-19 in PLWHA.^{19,39}

The limitations of this study include the non-probabilistic sampling (convenience), low sample size, the lower number of women and transgender people, younger adults, and restricted in-person data collection due to the pandemic. The convenience sample decreases our external validity and, therefore, the possibility of generalizability in a more heterogeneous population. Likewise, we need to disclose that the survey was conducted before the newly reported adverse effects from the AstraZeneca (ChAdOx1 nCoV-19) vaccine,^{45,46} which may have eventually impacted the responses given by our participants. Another limitation was the location of our participants. The majority resided in urban areas, which may have been associated with more access to healthcare, and information related to COVID-19 vaccination.

Conclusions

The majority of the participants (87.1%) in our study manifested a desire to be vaccinated, independently of all the variables analyzed. Taking advantage of this high percentage of willingness to be vaccinated among PLWHA, prioritizing these patients should be considered in developing countries. Additionally, new strategies need to be adopted to overcome the hesitancy and unwillingness toward the COVID-19 vaccination, especially in populations with risk factors for severe disease.

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ORCID iD

Yeimer Ortiz-Martínez  <https://orcid.org/0000-0001-9035-5654>

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