



Changes in sexual behavior, PrEP use, and COVID-19 experience among men who have sex with men in Mexico

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Abstract

This study aimed to explore the impact of COVID-19 lockdown on sexual behavior and PrEP use among a sample of men who have sex with men (MSM) in Mexico. Between April 20th and 27th, 2020 – well into Mexico’s lockdown – we conducted a virtual survey among 637 MSM exploring sexual behavior during the first month of the COVID-19 epidemic in Mexico and the impact of lockdown on PrEP use. We applied logistic regression models to assess predictors of PrEP use continuation. Over half the participants (52%) reported having a sexual encounter in the last two weeks. 75% of participants reported a decrease in the number of sexual partners because of COVID-19. The use of PrEP dropped from 90% to 64% during the first month of lockdown. Multivariate logistic regression models showed that younger participants were less likely to continue using PrEP than those 25+ years. Also, those who perceived themselves as not likely to acquire COVID-19 and those who reported using a condom in their last sexual encounter were more likely to continue using PrEP during the lockdown. This study provides evidence of the impact of COVID-19 on sexual behavior and PrEP use among MSM in Mexico during the lockdown. Sexual and reproductive health services will need to consider the risk of COVID-19 in providing HIV and PrEP programs to guarantee participants’ and health care providers’ safety.

Introduction

On January 30, 2020, the World Health Organization (WHO) declared a public health emergency for COVID-19. The first cases were documented in China by the end of

2019. Shortly after, new cases started to emerge globally. As of August 10, 2021, over 200 million cases and 4.3 million deaths due to COVID-19 had been reported worldwide [1]. Mexico registered the first confirmed case in February 2020. More than one year and a half later, the official number of cases and deaths reached over 3.9 million and almost 299,000, respectively [1].

With limited evidence on effective treatment strategies and no vaccine available, the initial response included efforts to slow the spread of SARS-CoV-2 (the virus that causes COVID-19) and avert as many deaths as possible. Since February 2020, the Mexican Ministry of Health (MoH) implemented a series of preventive actions, including lockdown, reducing mobility, increasing sanitation and hygiene measurements, and minimizing social contact – closing schools, suspension of work activities, and cancellation of massive events.

According to several aspects, the extent to which the Mexican population followed lockdown and other social distancing measures varied. For example, more than half

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of the labor force is employed in the economy's informal sector (jobs that do not offer benefits such as a fixed salary and access to social security). For them, staying at home is impossible since their income depends entirely on their daily activities. Adherence to restrictions may also vary across states and over time. Data on mobility in Mexico showed a decrease in the time spent at home between March and October 2020 and an increase in the use of public transport and parks and outdoor spaces [2].

MSM, already at risk of HIV infection, may have continued to engage in risky sexual behaviors, which exposed them to a dual-threat of HIV and COVID-19 acquisition and transmission. Although evidence on how COVID-19 impacted sexual behavior among these populations is still limited for Latin-American countries, studies in other contexts have documented changes in sexual practices and adherence to HIV Pre-exposure prophylaxis (PrEP). For example, one study used an online survey to characterize the impact of COVID-19 among 1,051 MSM in the United States. Results showed that half of the participants reported a reduction in sexual partners, and 68% reported a decrease in opportunities to have sex. Also, 18% and 25% of participants reported a decline in STI and HIV testing access, respectively [3]. An online survey among MSM in Brazil and Portugal found that more than half of participants (53%) had sex with casual partners during the sheltering period [4]. Also, data on social networking apps suggests that individuals seek connections during the pandemic [5] – for example, between February and March 2020, tinder's use increased by 15% in the United States and up to 25% in Italy and Spain [6].

Regarding the use of PrEP, data from 136 daily PrEP users in Australia showed that only 16% stopped PrEP, and 82% continued to take PrEP daily during July–August 2020 (second COVID-19 wave in the country) [7]. Another study of 847 gay and bisexual Australian men showed that almost 42% of PrEP users discontinued PrEP use during COVID-19 restrictions [8]. In Amsterdam, mobile app data from 136 MSM showed that PrEP use decreased from 74% before lockdown to 58% [9].

Although there is some evidence of the implications of the COVID-19 on sexual behavior and use of PrEP among MSM during the COVID-19 crisis, these studies have been conducted mainly in high-income settings, and their generalization to Latin American contexts is limited. To contribute to filling this gap, we conducted an online survey among MSM to explore the impact of COVID-19 lockdown on sexual behavior and PrEP use in Mexico.

Methods

Participants and procedures

We recruited participants of the ImPrEP study. Briefly, ImPrEP is a four-year, multi-country demonstration project assessing the take-up, retention, and feasibility of PrEP in Mexico, Brazil, and Peru. In Mexico, the project is conducted in three cities: Mexico City, Guadalajara, and Puerto Vallarta. At the time of this study, 2,449 MSM and transgender women (TGW) had been enrolled in ImPrEP.

Between April 20 to 27, 2020, we conducted an online survey about COVID-19 knowledge and attitudes. We sent an e-mail invitation to participants of the ImPrEP study and an additional 600 MSM and TGW previously approached during ImPrEP outreach activities. The survey instrument included questions on sociodemographic characteristics, social support, effects of COVID-19 on job and income, preventive measures taken to reduce the risk of contagion, mental health, and sexual behavior during the COVID-19 outbreak. Additionally, we sent a brief follow-up survey to collect data on PrEP adherence among PrEP users during May 2020.

Participants provided informed consent. The Institutional Review Board (IRB) of the National Institute of Public Health of Mexico reviewed and authorized this project (IRB number: CI-241-2020).

Measures

Demographics

We collected demographic characteristics of participants at the time of the survey, such as educational level (university degree or higher vs. lower), age, gender, state of residence (Mexico City vs. other), and self-reported HIV status. We also assessed the perceived level of social support (having family or friends who can lend money or take them to the hospital). With the latter, we created a variable with three categories; “0” indicates null social support, “1” some social support, and “2” high social support.

COVID-19

Survey collected information about COVID-19 experience and impact. We assessed the self-report presence of symptoms consistent with SARS-CoV-2 infection in the past two weeks (cough/fever/ shortness of breath/fatigue). We also explored whether participants reported to had contact with someone diagnosed with COVID-19 and their self-perceived risk of acquiring COVID-19 (very likely/not likely/not sure). To assess the pandemic's economic effects, we

included variables indicating loss of job and income because of COVID-19 (yes/no). We also evaluated the adherence to stay-at-home measures with a variable indicating whether the participant left home within the last 24 h (yes/no).

Sexual behavior

We explored sexual behavior among participants in the two weeks before the survey, including having sexual encounters (yes/no), the number and types of sexual partners, the use of drugs or other stimulants during the last encounter (yes/no), and condom use (yes/no). We created a variable indicating the type of sexual partner (stable, occasional, or transactional). We also explored the use of venues (bars, parties, parks, movie theatres), social media, and digital apps (Tinder and Grindr), during the outbreak to meet potential sex partners. Finally, participants also reported whether they had changed their sexual behavior because of the COVID-19 pandemic.

PrEP adherence

For ImPrEP enrollees, we explored the use of PrEP at the time of the survey using the question “Are you currently taking PrEP?” (yes/no). We also explored the impact of the COVID-19 pandemic on PrEP use with the question “Because of COVID-19, has your use of PrEP changed?” (Response options: increased/decreased/not changed).

Analyses

We explored the distribution of demographics, COVID-19 variables, sexual behavior, and PrEP adherence in our

sample. Analyses were stratified by age of participants (18–25 and 25 + years) and chi-square tests were performed to assess differences in the distribution of variables between these groups. Additionally, we conducted univariate and multivariate logistic regression models to assess predictors of PrEP use continuation during the COVID-19 lockdown. We tested different specifications to explore goodness of fit. We performed all analyses in Stata 15 [10].

Results

Study sample

We sent an invitation to participate in the study to 3,049 individuals. Of them, 881 started the questionnaire (29% rate), and 637 (72%) completed the survey and were included in our analysis. In Table 1 we show the characteristics of the sample. The 91% of participants were ImPrEP enrollees. Most of participants (82%) were older than 25 years, and highly educated (80.7% university degree or higher). Almost three-quarters of participants live in Mexico City, and 62% reported having high social support. Only 3% of participants reported to be living with HIV. After stratifying the sample by age, we observed that younger MSM were more educated (50.9% vs. 12.9% of university degree or higher) than those 25 + years. Also, a greater proportion of younger participants were living outside Mexico City at the time of the study. Those 18–25 years had a higher proportion of people living with HIV compared to the 25 + years group (6.0% vs. 1.9%).

Table 1 Demographic characteristics of Men Who Have Sex with Men who participated in the online survey

Variable	All participants (N=637)	18–25 years (N=116)	25 + years (N=521)	Statistical test (chi-square)	P value
	%				
ImPrEP participant	91.1	87.1	91.9	2.0	0.159
Yes					
Social support	11.7	14.7	10.6	1.6	0.459
Null social support	26.1	23.3	25.7		
Some social support	62.3	61.2	60.3		
High social support					
Education	19.3	49.1	87.1	80.8	<0.001
Less than university	80.7	50.9	12.9		
University degree or higher					
State of residence	71.1	62.1	73.9	6.6	0.011
Mexico City	28.3	37.9	26.1		
Other state in Mexico					
Employment	79.8	58.7	85.9	45.0	<0.001
Yes					
Self-reported HIV status	2.7	6.0	1.9	6.4	0.041
Positive					

COVID-19 experience

The 65% of participants reported having no symptoms

consistent with SARS-CoV-2 infection and 26.7% perceived high risk of acquiring COVID-19. Regarding economic impact of the pandemic, 24.2% and 23.7% of participants

Table 2 COVID-19 experience and economic impact among Men Who Have Sex with Men who participated in the online survey

Variable	All participants (N = 637)	18–25 years (N = 116)	25 + years (N = 521)	Statistical test (chi-square)	P value
%					
A. COVID-19 experience					
Symptoms of COVID-19 infection^a	11.1	13.8	10.6	1.2	0.545
Cough	3.5	4.3	3.3	1.9	0.602
Fever	6.3	7.8	6.0	0.9	0.826
Difficulty breathing	25.0	24.1	25.1	3.4	0.328
Fatigue	65.3	62.9	65.8	0.3	0.552
No symptoms					
Contact with someone with COVID-19	2.8	1.7	3.1	0.9	0.835
Yes					
Self-perceived risk of COVID-19 infection	26.7	32.8	25.3	5.6	0.346
Very likely	62.2	56.0	63.5		
Not likely	10.8	11.2	10.7		
Not sure					
Stayed at home in the last 24 h	33.6	37.9	32.6	1.5	0.506
Yes					
B. Economic impact of COVID-19					
Lost job because of COVID-19	24.2	20.7	25.0	17.1	<0.001
Yes					
Reduced income because of COVID-19	23.7	23.3	23.8	8.9	0.011
Yes					

^a Percentages can add up to more than 100% because participants may have reported more than one symptom

Table 3 Sexual behavior during the COVID-19 lockdown among Men Who Have Sex with Men who participated in the online survey

Variable	All participants (N = 637)	18–25 years (N = 116)	25 + years (N = 521)	Statistical test (chi-square)	P value
%					
A. Sexual behavior					
Sexual partners^a	44.6	44.4	44.6	3.5	0.967
1	44.3	42.2	44.6		
2–4	11.1	13.3	10.8		
5 or more					
Condom use in last sexual encounter	29.6	44.9	27.0	6.8	0.033
Yes					
Use of drugs in last sexual encounter	39.5	28.6	41.4	4.5	0.216
Yes					
B. Changes in sexual behavior because of COVID-19					
Number of sexual partners	4.1	4.3	4.0	2.1	0.543
Increased	75.0	79.3	74.1		
Decreased	20.9	16.4	21.9		
Not changed					
Condom use	9.3	4.1	10.2	4.0	0.399
Increased	6.6	10.2	6.0		
Decreased	84.1	85.7	83.8		
Not changed					
Use of drugs during sex	6.8	5.0	7.1	0.3	0.954
Increased	22.6	22.5	22.6		
Decreased	70.6	72.5	70.3		
Not changed					

^a Among those who had a sexual encounter

reported, respectively, losing their jobs and a reduction in their income because of the lockdown. When exploring differences between age groups, we found that the economic impact was higher among those 25+ years (Table 2).

Sexual behavior

More than half of participants had a sexual encounter (52%) in the last two weeks. Among them, 44.6% reported having only one sexual partner and 11.1% five or more. The 29% of participants reported using condom in their last sexual encounter and 39.5% had sex under the influence of drugs. Condom use was more frequent among those 18–25 years compared with participants 25+ years (44.9% vs. 27.0%). 75% of MSM reported a decrease in their number of sexual partners because of the COVID-19 pandemic and almost one quarter of the sample (22.6%) decreased their use of drugs during sex (Table 3). After stratifying the sample by type of sexual partner, we found a higher proportion of condom use among those who reported having sex with a casual partner in comparison with those who reported encounters with a steady partner. The proportion who reported a decrease in the number of sexual partners was also higher among those who had sex with a casual partner (Table S1).

Figure 1 shows the changes in sexual behavior because of COVID-19. 55% of participants reported having sex with a stable sex partner, 65% with an occasional partner, and 17% with transactional partners. We observed reductions in the number of sexual partners ranging from 26% in stable sex partners to 60% of occasional partners. With regard of the use of venues to meet sexual partners, the most popular venues used were apps (65%), social networks (57%), parks or public places (13%), orgies or sex parties (14%), and clubs and bars (13%). We also observed changes in the use of venues and types of sexual partners because of the COVID-19 pandemic. 60% of participants reported a decrease in the number of occasional sexual partners and almost 40% increased the use of social networks to meet potential sex partners.

PrEP use and adherence

In panel A of Fig. 2, we explore the current use of PrEP among ImPrEP enrollees. The 90% of ImPrEP participants reported taking PrEP at the time of the survey. Of them, 18% reported that their consumption of daily PrEP decreased because of the COVID-19 pandemic. One month later, only 64% of participants reported current consumption of PrEP. When exploring changes in PrEP intake because of the pandemic, 42% of participants reported a decrease in PrEP use during May 2020. Using logistic regression models, we explored predictors of PrEP use continuation and

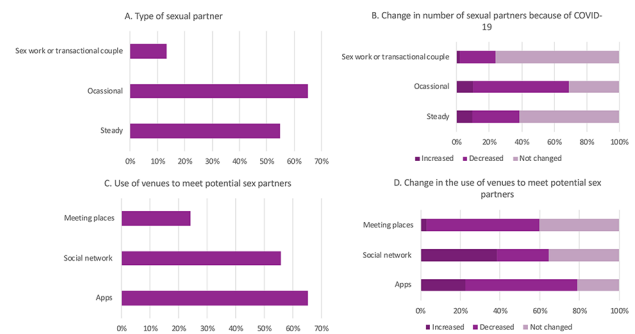


Fig. 1 Changes in sexual partners and use of venues to meet potential sex partners during the COVID-19 pandemic among Mexican MSM

presented results in Table 4. Column 1 of Table 4 shows the results of multivariate models. We found that younger participants were significantly less likely to continue using PrEP than those 25+ years (OR = 0.11; CI 95% 0.01–1.31, p value = 0.080). Results also suggest that staying at home was negatively associated with PrEP continuation (OR = 0.37; CI 95% 0.14–0.98, p value = 0.046). Also, those who perceived themselves as not likely to acquire COVID-19 and those who reported using a condom in their last sexual encounter were more likely to continue using PrEP during the lockdown (OR = 3.47; CI 95% 0.96–12.53, p value = 0.057 and OR = 3.62; CI 95% 1.33–9.88, p value = 0.012, respectively).

Discussion

This paper aimed to explore the impact of COVID-19 lockdown on sexual behavior and PrEP use among a sample of MSM in Mexico. Consistent with previous literature [11], our results show that staying at home measures did not stop a considerable proportion of MSM from seeking and finding sexual partners as more than half of the participants reported a sexual encounter in the last two weeks, and 65% had sex with a casual sex partner. Direct contact with partners outside their place of isolation could contribute to the chain of infection of SARS-CoV-2 and simultaneously increase the vulnerability to SARS-CoV-2 exposition and STIs among MSM [4].

Although the proportion of participants having sex with casual partners was high, we observed changes in sexual behavior due to the pandemic. For example, 75% of participants reported decreasing their number of sexual partners because of COVID-19. Our results also showed that 65% of survey participants reported using dating apps and social networks (56%) to connect with other men, and 52% reported using physical venues to meet with other MSM in person. Among those who used dating apps, 55% reported lower use because of COVID-19, while almost 40% reported

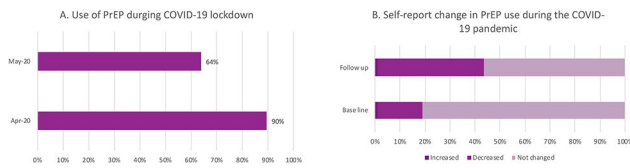


Fig. 2 Changes in PrEP use among Men Who Have Sex with Men who participated in the online survey

higher use of social networks to connect with other MSM during the pandemic. The use of places to meet other men in person decreased by 43%.

These findings are consistent with results from the US on the impact of COVID-19 among MSM. The authors found a reduction of 51% in the number of sexual partners among participants. Also, 35% and 50% of participants reported a decrease in dating apps to connect with other men and sites to meet other MSM in person, respectively [3]. Recent evidence suggested an increase in the utilization of virtual networks to search for sexual encounters. One study conducted among gay, bisexual, and other MSM in Canada found that 32% of participants reported camming or sexting online during the sheltering period [12]. Tinder connections increased by 15% in the US and 25% in Italy and Spain during the COVID-19 epidemic. The duration of chat activity also increased by 30% [6].

Also, our study showed that COVID-19 impacted participants’ sexual behavior and affected their use of PrEP. PrEP use decreased from 90 to 64% in one month. Results from our multivariate regression model show that younger participants and those with higher adherence to stay-at-home measures were less likely to continue using PrEP during the lockdown. The 26% drop in PrEP use is higher than the observed among a group of PrEP users in Amsterdam (where PrEP use changed from 74 to 58%) [9]. We also found that using a condom during the last sexual encounter was positively and significantly associated with PrEP use continuation, opposite to a previous study reporting more condom among those MSM who stopped taking PrEP during lockdown [8].

Although a significant proportion of study participants reported decreasing the number of sexual partners, our data suggest a substantial proportion of MSM who are not strictly adhering to COVID-19 mitigation recommendations. Vaccination against COVID-19 in Mexico began in January 2021. However, coverage is still low for the youngest population, and social distancing measures continue to be important aspects of the SARS-CoV-2 containment strategies in the country. Also, as new virus variants are starting to emerge, mitigation measures could be tightened, particularly in crowded states (such as Mexico City). Protracted mitigation measures may result in even further compliance challenges, placing these MSM at increased risk of acquiring or

Table 4 Unadjusted and adjusted logistic regression models for PrEP use continuation among Men Who Have Sex with Men who participated in the online survey^a

Variable	Adjusted OR	CI 95%	Statistical test (z)	p value	Unadjusted OR	CI 95%	Statistical test (z)	p value
A. Demographics								
Age (1 = 18–25)	0.11	(0.01, 1.31)	-1.75	0.080	1.02	(0.51, 2.03)	0.05	0.959
Education (1 = university degree or higher)	0.65	(0.15, 2.91)	-0.56	0.575	0.51	(0.24, 1.04)	-1.84	0.065
State of residence (1 = Mexico City)	1.77	(0.58, 5.38)	1.0	0.318	1.36	(0.74, 2.49)	0.98	0.327
Employed (1 = yes)	1.73	(0.33, 8.86)	0.65	0.517	1.26	(0.63, 2.52)	0.521	0.64
Social support (ref = null social support)		(0.16, 4.28)	-0.24	0.809	0.85	(0.32, 2.23)	-0.34	0.736
Some social support	0.81	(0.31, 5.59)	0.36	0.717	1.45	(0.62, 3.37)	0.86	0.388
High social support	1.31							
B. COVID-19 experience								
Stayed home in the last 24 h (1 = Yes)	0.37	(0.14, 0.98)	-2.0	0.046	0.54	(0.32, 0.90)	-2.36	0.018
Self-perceived risk of COVID-19 infection (ref = very likely)	3.47	(0.23, 7.53)	1.90	0.057	1.02	(0.48, 2.14)	0.04	0.968
Not likely	1.28		0.27	0.789	0.64	(0.25, 1.62)	-0.94	0.346
Not sure								
C. Sexual behavior								
Number of sexual partners	1.15	(0.91, 1.44)	1.17	0.241	1.04	(0.85, 1.26)	0.36	0.721
Condom use at the last sexual encounter (1 = Yes)	3.62	(1.33, 9.88)	2.51	0.012	2.60	(1.15, 5.88)	2.3	0.022
Drug use in last sexual encounter (ref = yes)		(0.56, 4.61)	0.88	0.378	1.72	(0.73, 4.10)	1.23	0.217
No	1.61	(0.23, 5.20)	0.10	0.918	1.16	(0.28, 4.82)	0.20	0.843
Not a drug user	1.09							

^aDependent variable PrEP continuation (1 = continue using PrEP, 0 = interrupted PrEP)

transmitting SARS-CoV-2 infection, mainly if they ignore stay-at-home orders so they can meet sexual partners. Also, if MSM, at the same time, are facing interruptions in HIV/STI services (for example, PrEP), we may expect to observe an increased HIV and STI incidence among these populations.

Readers should interpret our results in light of some limitations. Given our sampling strategy, our results are not representative of the MSM population in Mexico. Second, participants who responded to our questionnaire were significantly younger, more educated, with higher employment, and mostly living in Mexico City, compared to those enrolled in the ImPrEP study. Also, although we documented a decrease in PrEP use, we could not assess to what extent participants switched intake schemes (for example, from daily to 2-1-1) or used any other strategies to cope with the lack of PrEP. Finally, our measure of adherence to stay-at-home recommendations is imperfect. We included leaving home in the last 24 h as an indicator of adherence. However, restrictions in Mexico allowed people to leave their homes for specific activities during lockdown – i.e., going to work, grocery shopping, etc.

Conclusions

Our study provides evidence on sexual behavior and COVID-19 impact among MSM and Mexico. Our findings showed how HIV high-risk populations changed their sexual behavior because of the COVID-19 pandemic. We also found a 26% decrease in PrEP use. Although participants reported a reduction in the number of sexual partners (particularly casual), we do not have evidence to what extent these changes were transient. Our study indicates the importance of continued sexual health services (including STI screening and PrEP) during COVID-19 restrictions. Sexual and reproductive health services will need to consider the risk of COVID-19 in providing HIV and PrEP programs to guarantee participants' and health care providers' safety.

Supplementary information The online version contains supplementary material available at <https://doi.org/10.1007/s10461-022-03688-4>.

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Authors' contributions JG and DC lead the data collection, analysis, and wrote the first draft of the paper; HV assisted with data analysis

and critically review the manuscript; SBA conceived the study, supervised data collection and analysis and review the manuscript.

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Availability of data and material Data for this analysis is available under request.

Code Availability Not applicable.

Declarations

Conflicts of interest/Competing interests Authors have no conflict of interest to declare.

Ethics approval The methods for this study were reviewed and approved by the IRB of the National Institute of Public Health of Mexico (IRB number: CI-241-2020).

Consent to participate All participants provided consent to participate in this study.

Consent for publication Not applicable.

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