

## How did COVID-19 measures impact sexual behaviour and access to HIV/STI services in Panama? Results from a national cross-sectional online survey

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## **Abstract**

**Objective** To describe reported changes in sexual behaviours, including virtual sex (sexting and cybersex), and access to HIV/STI testing and care during COVID-19 measures in Panama.

**Methods** We conducted an online cross-sectional survey from 8 August to 12 September 2020 among adults ( $\geq 18$  years) residing in Panama. Participants were recruited through social media. Questions included demographics, access to HIV/STI testing and HIV care, and sexual behaviours 3 months before COVID-19 social distancing measures and during social distancing measures (COVID-19 measures). Logistic regression was used to identify associations between variables and behavioural changes.

**Results** We recruited 960 participants; 526 (54.8%) identified as cis-women, 366 (38.1%) cis-men and 68 (7.1%) non-binary or another gender. The median age was 28 years (IQR: 23–37 years), and 531 of 957 (55.5%) were of mixed ethnicity (mixed Indigenous/ European/Afro-descendant ancestry). Before COVID-19 measures, virtual sex was reported by 38.5% (181 of 470) of cis-women, 58.4% (184 of 315) cis-men and 45.0% (27 of 60) non-binary participants. During COVID-19 measures, virtual sex increased among 17.2% of cis-women, 24.7% cis-men and 8.9% non-binary participants. During COVID-19 measures, 230 of 800 (28.8%) participants reported decreased casual sex compared with pre-COVID-19 measures. Compared with pre-COVID-19 measures, decreased casual sex was reported more frequently during COVID-19 measures by cis-men compared with cis-women (39.2% vs 22.9%, urban/rural adjusted OR (AOR)=2.17, 95% CI 1.57 to 3.01), and by Afro-descendant compared with participants of mixed ethnicity (40.0% vs 29.8%, AOR=1.78, 95% CI 1.07 to 2.94). Compared with no change in virtual sex (16.8%), increased virtual sex (38.5%, AOR=1.78, 95% CI 1.10 to 2.88) and decreased virtual sex (86.7%, AOR=16.53, 95% CI 7.74 to 35.27) were associated with decreased casual sex encounters. During COVID-19 measures, HIV/STI testing could not be obtained by 58.0% (58 of 100) of the participants who needed a test, and interrupted HIV care was reported by 53.3% (8 of 15) of participants living with HIV.

**Conclusions** COVID-19 measures in Panama were associated with a decrease in casual sex among cis-men and Afro-descendant people, while access to HIV/STI testing and care was seriously disrupted.

## **Introduction**

HIV and other sexually transmitted infections (STIs) have been on the rise in Panama for the past several years [1], and groups including young adults [2] and Indigenous youth who live in Comarcas (administratively semi-autonomous Indigenous regions) [3] are particularly affected. As of 2019, HIV prevalence nationwide was estimated at 0.6%, belying significant concentrated epidemics among men who have sex with men (MSM) (6.9%) and transwomen (29.6%) populations [1]. Correspondingly, STI prevalence is more concentrated among MSM, female sex workers, and adolescents [3-6]. Higher HIV and STI prevalence in Panama is associated with engaging in sexual activity with new and casual partners, due to increased access to connected sexual networks and condomless sex soon after partnership initiation [1].

The COVID-19 pandemic has brought several important changes relevant to sexual health; it also created challenges for in-person data collection. Many population health surveys and other sexual health research were initially paused. A small number of published studies from North America and Europe have examined the impact of COVID-19 measures on sexual behaviours [7-9]. However, there is a research gap in Latin America, especially among more isolated rural and Indigenous populations. There is also little information in the region about how COVID-19 measures have affected HIV/STI testing and care services.

Given the relatively high prevalence of HIV and STIs in Panama and the potential for COVID-19 measures to affect both behaviours and access to medical care, the objective of this study was to examine reported changes in sexual behaviours and access to key sexual health services during COVID-19 measures using an online survey. Based on the association of new and casual partnerships with HIV and STIs, we focused on identifying factors associated with decreased casual sex during COVID-19 measures.

## **Methods**

This study was an online, cross-sectional survey conducted as part of the first round of International Sexual Health And REproductive Health (I-SHARE), a series of surveys conducted

in 34 countries to study sexual and reproductive health during COVID-19 measures [10]. I-SHARE Panama was conducted from August 8 to September 12, 2020 at the end of the strictest COVID-19 lockdown measures (**Figure 1**). Participants reported behaviours from the three-months period before lockdown measures (December 17, 2019 to March 17, 2020) and during the strictest COVID-19 lockdown measures (March 18 to September 12, 2020). The survey was advertised on the website and social media (Facebook and Twitter) of the national public health research institute, Instituto Conmemorativo Gorgas de Estudios de la Salud; on social media of non-profit organisations; and through SMS and direct messages sent to individuals and groups who had previously interacted with partner organizations. Targeted invitation was included in provincial and Comarcal social media platforms to increase participation in these regions to better match census population estimates (**Supplementary Table 1**). Promotion messages asked adults to fill out the survey and/or share the survey link. No IP-address restrictions were included (more than one result can be recorded on the same device) as mobile phones are commonly shared within households and among community members.

### ***Study design and populations***

We used convenience sampling. All adults aged  $\geq 18$  years who saw the social media/website/messages and lived in Panama were invited to participate.

### ***Questionnaire creation and study procedures***

The questionnaire was collaboratively developed with the I-SHARE consortium [10]. Questions were based on existing survey items and multi-item scales, with some new items developed to address the COVID-19 context [11]. The Panama instrument was translated from the consortium English into Spanish, programmed into OpenDataKit (University of Washington, USA) and pilot-tested with 15 individuals for understanding and acceptability. Participants completed the online questionnaire in 10-30 minutes. Only items associated with skip patterns were obligatory.

Key variables of interest occurring over the three months before and during COVID-19 measures included: sexual intercourse with a casual (new or non-long-term) partner, sexual intercourse with a long-term partner, virtual sex (including 'sexting' and 'cybersex'), use of sexual health services such as HIV/STI testing (“Did COVID-19 measures stop/hinder testing access?”) and

HIV care (“Had HIV treatment appointments been cancelled?”). Other influencing variables included: age, sex, gender, number of children, ethnic group, urban/rural residence, household and personal income, sexual orientation, general sexual satisfaction, practice of masturbation, long-term partner variables (cohabitation, tensions, emotional support, cuddling) and condom use with casual and/or long-term partners during the specified time.

### ***Statistical analyses***

We conducted univariable analyses to describe demographic characteristics. We used  $\chi^2$  tests to evaluate differences by participants’ sex and other influencing variables and the differences between urban/rural residence; casual sex; and sexual activity with their long-term partner three months before and during COVID-19 measures. All participants with valid data were included; due to non-response on some questions, sample sizes varied.

In addition, we examined factors related to reported decreased casual sex during COVID-19 measures. We undertook a series of three multivariable analyses comparing participants who reported the frequency of casual sex to have stayed the same over the two periods versus those who reported a decrease during COVID-19 measures, having excluded from analysis individuals who reported an increase in casual sex (n=21). The three models focused on different sets of variables: a) participant socio-demographic variables, b) individual, casual partner variables, c) long-term partners’ behaviours. We first used logistic regression to calculate unadjusted bivariable odds ratios (ORs) and 95% confidence intervals (CIs). Variables associated with the decreased casual sex outcome at  $p < 0.2$  level in bivariable analyses were included in multivariable models. As the duration of COVID-19 measures differed between urban and rural regions, we adjusted for residence (urban/rural) in the multivariable analyses. Variables independently associated with decreased casual sex at  $p < 0.1$  were included in the final model to provide adjusted odds ratios (AORs) and 95% CIs controlling for participant gender and urban/rural residence. Associations with  $p < 0.05$  were considered statistically significant.

### ***Ethical considerations***

We obtained ethical approval from the Comité Nacional de Bioética de Panama (EC-CNBI-2020-06-73), Ghent University (BC-07988) and the University of North Carolina at Chapel Hill

for secondary data analysis. Only participants who gave online informed consent by ticking a box could participate. No monetary incentive was provided to participants. The survey did not collect WhatsApp phone numbers, telephone numbers, IP addresses, or any other identifying information.

## **Results**

In total, participants from 11 out of 12 Panamanian provinces responded to the survey; provincial distribution was similar to the 2020 census projection [12] (**Supplementary Table 1**). Of 960 participants who completed the online questionnaire, 526 (54.8%) identified as cis-women, 366 (38.1%) cis-men and 68 (7.1%) non-binary or of another gender. The median age was 28 years (interquartile range [IQR]: 23-37y). Mixed ethnicity (mixed Indigenous/European/Afro-descendant ancestry) was reported by 55.5% (531/957), Afro-descendant 10.6% (101/957), White 22.2% (212/531), Asian 1.7% (16/957) and Indigenous 10.1% (97/957). Overall, 72.4% (679/938) identified as heterosexual, 7.8% (73/938) as bisexual, 9.6% (90/938) as gay or lesbian, and 10.2% (96/938) as asexual, pansexual, queer, questioning or another orientation (**Table 1**).

### ***Sexual behaviours***

Previous sexual experience was reported by 88.8% (852/960) of participants. Before COVID-19 measures, casual sex among sexually experienced participants was reported by 18.2% (85/466) of cis-women, 32.4% (101/312) of cis-men and 23.7% (14/59) of non-binary participants (**Supplementary Table 2**). Of those who reported casual sex, always using a condom in such encounters was reported by 50.6% (43/85) of cis-women, 61.2% (63/103) cis-men and 53.9% (7/13) non-binary participants (**Supplementary Table 2**). Of all participants, compared to before COVID-19, during COVID-19 measures, 68.6% (549/800) of respondents reported no change, 28.8% (230/800) reported a decrease, and 2.6% (21/800) reported an increase in casual sex (**Table 2, Panel A**).

Of participants with a long-term partner, sex with the long-term partner and casual sex encounter at least monthly before COVID-19 measures was reported by 18.2% (80/440) of cis-women, 33.5% (93/278) cis-men, and 25.5% (14/55) non-binary participants.

Overall, before COVID-19 measures, 47.1% (394/837) of participants reported being sexually satisfied (**Supplementary Table 2**). Of those not satisfied before COVID-19 measures, 33.9% (150/442) reported increased satisfaction during COVID-19 (**Table 2**).

Before COVID-19 measures, 46.4% (392/845) participants reported using virtual sex at least once a month, including sexting 44.1% (369/837) and cybersex 20.4% (172/842). Use of virtual sex had increased during COVID-19 measures for 19.9% (159/800) of participants, decreased for 11.8% (94/800), and remained unchanged for 68.4% (547/800) (**Table 2, Panel A**).

### ***Long-term partner relationship and sexual behaviours***

Overall, 66.4% (637/960) participants reported having a long-term relationship before COVID-19 measures; 504 (79.1%) of whom reported to still be in their long-term relationship during COVID-19 measures. Sexual intercourse at least monthly with their long-term partner was reported by 92.7% (332/358) cis-women, 82.5% (160/194) cis-men and 90.9% (40/44) non-binary participants. Decreases in sex with their long-term partner during COVID-19 measures was reported by 50.2% (153/305) cis-women, 52.2% (82/157) cis-men, and 48.3% (14/29) non-binary participants (**Table 2, Panel B**).

### ***Access to HIV/STI testing and HIV care services***

Overall, 45.6% (375/823) participants reported that condoms were more difficult to find during COVID-19 measures. This percentage did not differ between urban and rural areas (44.2% [273/299] urban compared to 49.5% [101/204] rural,  $p=0.38$ ).

Of the 10.4% (100/960) who reported needing an STI or HIV test, 58.0% (58/100) reported they could not receive it due to the COVID-19 measures. This percentage was higher in urban areas; however the difference was not significant (62.0% [44/71] urban compared with 48.3% [14/29] rural,  $p=0.20$ ).

Few (15/960, 1.6%) participants reported to be living with HIV, 8 of whom reported to have had an HIV care appointment cancelled or postponed due to COVID-19 measures. Thirteen of the 15

respondents living with HIV were in urban areas, and all participants living with HIV reported worrying about ART shortages.

### ***Factors related to decreased casual sex during COVID-19***

#### *Participant characteristics*

After adjusting for urban/rural residence, cis-men were more likely to report decrease in casual sex during COVID-19 measures (39.2%) compared with cis-women (22.9%) (AOR=2.17, 95% CI 1.57 to 3.01) (table 3 Panel A).

After adjusting for participant gender and urban/rural residence, several factors were associated with decreased casual sex during COVID-19 measures. Individuals of Afro-descendant ethnicity reported a larger decrease in sex with casual partners (40.0% compared with 29.8% among mixed ethnicity, AOR=1.78, 95% CI 1.07 to 2.94). There was a weak association between sexual orientation and decreased sex with casual partners (43.2% among gay or lesbian participants vs 26.5% of heterosexual participants, AOR=1.58, 95% CI 0.86 to 2.91) (table 3 Panel B).

Participants who reported the same or increased levels of alcohol use during COVID-19 measures were less likely to report decreased casual sex compared with those who decreased their alcohol use during COVID-19 measures (19.5% and 23.7% vs 40.4%, AOR=0.38, 95% CI 0.26 to 0.55 and AOR=0.53, 95% CI 0.32 to 0.85, respectively).

#### *Individual sexual behaviours and virtual sex use*

After adjusting for participant gender and urban/rural residence, an increase in sexual satisfaction was associated with a decrease in casual sex: 45.3% of those reporting an increase in sexual satisfaction also reported decreased casual sex compared with 19.8% among those reporting decreased sexual satisfaction (AOR=2.99, 95% CI 1.85 to 4.84).

Reported changes in virtual sex during COVID-19 measures were also associated with decrease in casual sex in adjusted models. Compared with no change in virtual sex (16.8%), an increase in



virtual sex (38.5%) was associated with decreased casual sex (AOR=1.78, 95% CI 1.10 to 2.88), and decreased virtual sex (86.7%, AOR=16.53, 95%CI 7.74 to 35.27) was associated with decreased casual sex.

## **Discussion**

This study examined reported changes in sexual behaviours, use of virtual sex, and access to HIV/STI testing and HIV care during the implementation of COVID-19 measures in Panama. Our results among a diverse convenience sample of urban and rural dwellers across 11/12 provinces expand the literature about sexual behaviours during COVID-19 measures in Latin America. We found that overall sexual activity may have decreased among some individuals. Casual sex, widely practised by 18.2% of cis-women, 32.4% of cis-men and 23.7% of nonbinary participants pre-COVID, decreased for 22.9% of cis-women, 39.1% of cis-men and 29.6% of nonbinary participants. On the other hand, virtual sex, also widely practised by 20 to 40% of respondents pre-COVID-19, increased for 20% of respondents. Finally, participants reported COVID-19 measures interrupted access to condoms, HIV/STI testing and, worryingly, to HIV care for those who needed the services.

A large proportion of participants reported decreased sexual activity during COVID-19 measures, findings that differ from the Latvian I-SHARE study, which found most individuals did not have a change sexual frequency during COVID-19 measures [13]. Half of Panama participants reported decreased sex with a long-term partner. This may have been due to extended periods together and increased time with children or other housemates [7, 14]. Sex with a casual partner decreased among more than one-quarter of individuals. Sex with casual partners has also shown to have decreased in the United States and Australia early in the pandemic [7, 9, 15]. A decrease in casual sex partners may provide a unique opportunity for a reduction in behavioural risk, but further research is needed.

Nearly half of our participants reported engaging in virtual sex before COVID-19 measures; 20% used cybersex, and 40% used sexting at least monthly, including in very rural provinces. Twenty percent of participants reported increased virtual sex during COVID-19 measures. Before COVID-19 measures, cybersex use in Sweden (32%) was found to be slightly higher than what was found in Panama [16]. Some researchers and media outlets hypothesised that virtual sex might increase during COVID-19 due to fewer in-person sexual encounters. However, the first analyses from North America did not demonstrate this [8, 9]. Interestingly, we found that participants who reported to have either increased or decreased virtual sex use were more likely to report a decrease in casual sex, compared to those who did not change their virtual sex use. Our findings indicate that virtual sex use in Panama may serve both as a substitute and a preamble to in-person sex. A pre-COVID-19 meta-analysis found positive correlations between sexting, number of sex partners and condomless sex [17]. As virtual sex practices emerge as normalized, sex-positive tools of sexual behaviour in Panama, privacy and potential extortion warnings should be addressed within the applications themselves. Additionally, community-wide campaigns could educate on privacy laws and recommend use of encrypted applications [18].

The HIV epidemic is concentrated among specific populations, particularly MSM and transwomen; STI prevalence is high among adolescents and unregistered female sex workers [4-6, 19]. Regular testing of HIV/STI in these populations is considered to aid in controlling transmission. Interruption of HIV/STI services may lead to decreased diagnoses and treatment, thereby increasing continued transmission and increase in sequelae. During COVID-19 measures in Panama, access to key services was interrupted, with over 50% of those needing HIV/STI testing not getting it. This is supported by an overall decrease of 71% of new HIV diagnoses reported by the Panama government during that period [20]. An Australian study also found a substantial decrease in HIV tests during 2020 [21]. HIV testing services elsewhere, including Latin America, have been significantly interrupted during the pandemic [22-25]. Respondents also reported disrupted access to STI and HIV prevention (condoms) and HIV care commodities. Such difficulties in accessing HIV/STI testing and care in Panama during the COVID-19 measures may have been related to limited transportation, testing facility closures or the *covidization* of health services. Panama does not have policies supporting HIV self-testing and

STI sample self-collection, as can be found elsewhere globally. Therefore, our findings suggest the need for patient self-testing approaches [26, 27] that would help maintain continuity of services during national medical crises.

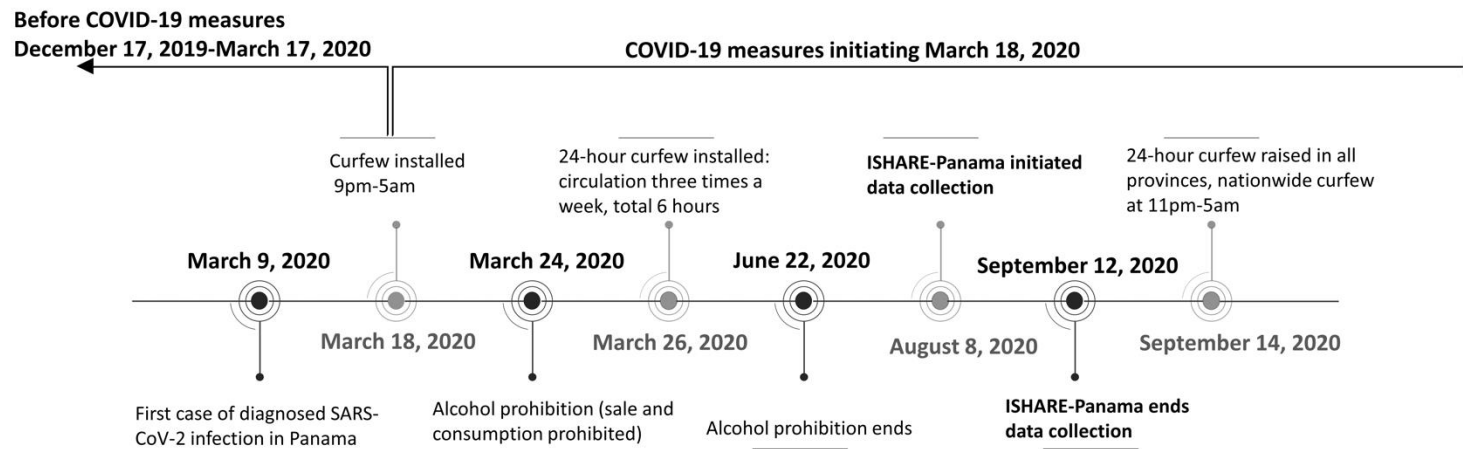
Our study has several limitations. First, online questionnaires are likely to suffer selection bias as they are only able to include participants who have seen the announcement and are both motivated and able to use online tools. However, given the health emergency context, there was no feasible way to organise a population-representative survey. Additionally, there are no guidelines for online surveys in the EQUATOR network [28]. However our study used best practices for the conduct of online research during COVID-19 as outlined in a publication authored by some of our co-authors [29]. These recommendations include using an online panel for the study design, implementing the survey with partner organizations, designing the survey for the end-user experience, and having a prespecified analysis plan [29]. We found that our sample had a similar structure to the 2020 census data in terms of ethnicity, urban/rural residence, and province of residence (**Supplementary Table 1**), except that our sample had more female participants compared to census data. This finding is common in sexual and reproductive health surveys [30]. Thirdly, casual sexual encounters may be underreported as over half of our participants were in long-term partnerships; additionally, memory bias may have enhanced or impaired recall of behaviours from before and during COVID-19 measures. Fourthly, comparisons between sexual orientation and gender groups should be interpreted with caution given the relatively smaller sample of non-cisgender respondents. Fifthly, this paper focused on casual sexual encounters and sexual behaviours in general. Other related sexual health topics, including intimate partner violence, access to reproductive health services and mental health will be reported elsewhere. Sixthly, as this is a single behavioural cross-sectional study, and the capacity for collecting biological samples was limited during this time, therefore there should be caution when making any causal inferences from the data. Lastly, this analysis is unable to correlate behaviour with biological outcomes, therefore we do not know the impact of behaviour changes on HIV or STI rates.

Our study has implications for STI and HIV research and policy. Our data suggest the need and usefulness of more rigorous behavioural research during national medical crises that have the

capacity to disturb normal services. While we were able to recruit a convenience sample during the pandemic, national panels or other methods can be used to obtain less biased observations [29]. These data will be important as lockdown conditions are relaxed and reinforced. From a policy perspective, our data underline the importance of maintaining the continuity of HIV/STI testing and care services even during emergency responses.

## **Conclusions**

Our findings add to the sexual behaviour literature in Panama during COVID-19. We found a decrease in sexual activity among some individuals for casual encounters, paralleled with a rise in the use of virtual sex. STI and HIV prevention and care services were significantly disrupted during COVID-19 measures, suggesting the need for decentralized services.



**Figure 1: Timeline of before COVID-19 social distancing measures and COVID-19 social distancing measures in Panama**

**Table 1 Socio-demographic characteristics of the study population, Panama, 2020**

		N	%
<b>Sex</b>		N=960	
	<b>Female</b>	563	58.6
	<b>Male</b>	397	41.4
<b>Gender</b>		N=960	
	<b>Cis-Woman</b>	526	54.8
	<b>Cis-Man</b>	366	38.1
	<b>Non-binary/another gender</b>	68	7.1
<b>Age</b>	<b>median (28, IQR:23-37)</b>	N=960	
	<b>18-23</b>	280	29.2
	<b>24-28</b>	205	21.4
	<b>29-37</b>	246	25.6
	<b>38 and above</b>	229	23.8
<b>Place of residence</b>		N=958	
	<b>Capital City, large or medium city</b>	656	68.5
	<b>Rural town, community or Comarcal town</b>	302	31.5
<b>Number of children</b>	<b>Median (0, IQR: 0-1)</b>	N=960	
	<b>0</b>	641	66.8
	<b>1-2</b>	250	26.0
	<b>3 and more</b>	69	7.2
<b>Highest completed level of education</b>		N=957	
	<b>Secondary or less</b>	127	13.3
	<b>Some university</b>	289	30.2
	<b>Post-secondary (university completed)</b>	541	56.5
<b>Ethnic group</b>		N=957	
	<b>Mixed*</b>	531	55.5
	<b>Afro-descendent</b>	101	10.6
	<b>White</b>	212	22.2
	<b>Asian</b>	16	1.7
	<b>Indigenous</b>	97	10.1
<b>Successful following of COVID-19 measures</b>		N=957	
	<b>Not at all or only some</b>	75	7.8
	<b>Mostly or strictly follow them</b>	882	92.2
<b>Have you been in strict confinement due to COVID-19</b>		N=955	
	<b>No</b>	817	85.5
	<b>Yes</b>	138	14.5
<b>SARS-CoV-2 test</b>		N=956	
	<b>Never</b>	775	81.1
	<b>Yes, and positive at least once</b>	26	2.7
	<b>Yes, and always been negative</b>	155	16.2
<b>Including yourself, how many people do you live with</b>	<b>median 3 people (IQR2-4)</b>	N=943	
	<b>0</b>	33	3.5
	<b>1</b>	118	12.5
	<b>2</b>	233	24.7
	<b>3 to 4</b>	439	46.6
	<b>5 or more</b>	120	12.7
<b>Change in employment</b>		N=935	
	<b>No change in what I do or going to work</b>	183	19.6
	<b>Work from home part-time or fulltime</b>	448	47.9
	<b>lost work or without work before and during COVID-19 measures</b>	304	32.5
<b>Household income since COVID started</b>		N=926	
	<b>US\$0 a \$499 monthly</b>	273	29.5
	<b>US\$500 a \$999 monthly</b>	176	19.0
	<b>US\$1000 a \$2000 monthly</b>	206	22.3
	<b>US\$2001-\$5000 monthly</b>	195	21.1
	<b>US\$5001 and higher monthly</b>	76	8.2
<b>Changes in household economic situation since COVID started</b>		N=953	
	<b>Household economics got worse</b>	483	50.7
	<b>No changes in household economics</b>	445	46.7
	<b>Household economics got better</b>	25	2.6
<b>Weekly Alcohol use during COVID-19 social distancing</b>		N=932	
	<b>Decreased</b>	427	45.8

	<b>The same</b>	349	37.4
	<b>Increased</b>	156	16.7
<b>Sexual orientation</b>		N=938	
	<b>Heterosexual</b>	679	72.4
	<b>Bisexual</b>	73	7.8
	<b>Gay or Lesbian</b>	90	9.6
	<b>Asexual, pansexual, queer, questioning, another gender</b>	96	10.2

\*mixed ethnicity is mixed Indigenous/European/Afro-descendant/Asian ancestry

**Table 2. Sexual behaviours during COVID-19 social distancing measures in Panama, Panama, 2020**

		All participants		Cis-women		Cis-men		Non-binary/another gender	
		N	%	N	%	N	%	N	%
<b>Panel A: Individual and casual partner behaviours</b>									
<b>Sexual Satisfaction</b>		N=833		N=463		N=311		N=59	
	Decreased	406	48.7	243	52.5	133	42.8	30	50.8
	The same	211	25.3	115	24.8	81	26.1	15	25.4
	Increased	216	25.9	105	22.7	97	31.9	14	23.7
<b>Sexual Problems*</b>		N=486		N=301		N=156		N=29	
	Decreased	240	49.4	140	46.5	83	53.2	17	58.6
	The same	141	29.0	89	29.6	44	28.2	8	27.6
	Increased	105	21.6	72	23.9	29	18.6	4	13.8
<b>Masturbated</b>		N=817		N=455		N=307		N=55	
	Decreased	181	22.1	120	26.4	46	15.0	15	27.3
	The same	410	50.2	246	54.1	132	43.0	32	58.2
	Increased	226	27.7	89	19.6	129	42.0	8	14.6
<b>Pornography use</b>		N=804		N=442		N=306		N=56	
	Decreased	141	17.5	78	17.7	52	17.0	11	19.6
	The same	483	60.1	306	69.2	138	45.1	39	69.6
	Increased	180	22.4	58	13.1	116	37.9	6	10.7
<b>Virtual sex**</b>		N=800		N=441		N=303		N=56	
	Decreased	94	11.8	36	8.2	45	14.9	13	23.2
	The same	547	68.4	329	74.6	180	59.4	38	67.9
	Increased	159	19.9	76	17.2	78	24.7	5	8.9
<b>Casual sex encounters</b>		N=800		N=441		N=304		N=55	
	Decreased	230	28.8	99	22.4	115	37.8	16	29.1
	The same	549	68.6	333	75.5	178	58.5	38	69.1
	Increased	21	2.6	9	2.0	11	3.6	1	1.8
<b>Condom use with a casual partner</b>		N=198		N=81		N=102		N=15	
	Decreased	35	17.7	12	14.8	19	18.6	4	26.7
	The same	131	66.2	59	72.8	63	61.8	9	60.0
	Increased	32	16.2	10	12.3	20	19.6	2	13.3
<b>Panel B: Long-term relationship behaviours</b>									
<b>Long-term partnership tensions***</b>		N=495		N=308		N=159		N=28	
	Decreased	169	34.1	107	34.7	51	32.1	11	39.3
	The same	158	31.9	102	33.1	47	29.6	9	32.1
	Increased	168	33.9	99	32.1	61	38.4	8	28.6
<b>Sex with a long-term partner</b>		N=491		N=305		N=157		N=29	
	Decreased	249	50.7	153	50.2	82	52.2	14	48.3
	The same	178	36.2	108	35.4	61	38.8	9	31.0
	Increased	64	13.0	44	14.4	14	8.9	6	20.7
<b>Condom use with a long-term partner</b>		N=479		N=298		N=154		N=27	
	Decreased	77	16.1	47	15.8	24	15.6	6	22.2
	The same	386	80.6	244	81.9	122	79.2	20	74.1
	Increased	16	3.3	7	2.3	8	5.2	1	3.7

\*Sexual problems are individual or partners issues including erectile dysfunction or inhibited desire, orgasm

\*\*virtual-sex is a composite variable of cybersex use and/or sexting use

\*\*\*Long-term partner relationship tensions **Fight with long-term partner**



**Table 3: Demographic, social and sexual factors associated with a reported decrease in casual sex partners during COVID-19 measures in Panama, 2020**

		Casual sex stayed the same*	Casual sex decreased	OR	p-value	AOR**	p-value
<b>Panel A: Social and demographic factors associated with decreased sexual encounters with casual partners</b>							
<b>Gender</b>							
	Cis-woman	333/432 (77.1)	99/432 (22.9)	1			
	Cis-man	178/293 (60.8)	115/293 (39.2)	2.17 (1.57-3.00)	<0.01	2.17 (1.57-3.01)	<0.01
	Non-binary /Another gender	38/54 (70.4)	16/54 (29.6)	1.42 (0.76-2.65)	0.28	1.41 (0.75-2.65)	0.29
<b>Age</b>							
	18-23	134/214 (62.6)	80/214 (37.4)	1		1	
	24-28	118/166 (71.1)	48/166 (28.9)	0.68 (0.44-1.05)	0.08	0.67 (0.42-1.10)	0.10
	29-37	151/201 (75.1)	50/201 (24.9)	0.55 (0.36-0.87)	<0.01	0.63 (0.38-1.04)	0.07
	38 and above	146/198 (73.7)	52/198 (26.3)	0.60 (0.39-0.91)	0.02	0.92 (0.52-1.65)	0.80
<b>Children</b>							
	0	357/536 (66.4)	179/536 (33.4)	1		1	
	1-2	153/198 (77.3)	45/198 (22.7)	0.59 (0.40-0.86)	<0.01	0.68 (0.42-1.10)	0.12
	3 and more	39/45 (86.7)	6/45 (13.3)	0.31 (0.13-0.74)	<0.01	0.23 (0.08-0.63)	0.01
<b>Ethnic group</b>							
	Mestizo	314/447 (70.2)	133/447 (29.8)	1		1	
	Afro-descendent	54/90 (60.0)	36/90 (40.0)	1.57 (0.98-2.51)	0.06	1.78 (1.07-2.94)	0.02
	White	140/182 (76.9)	42/182 (23.1)	0.71 (0.47-1.06)	0.09	0.72 (0.47-1.10)	0.14
	Asian	6/11 (54.6)	5/11 (45.4)	1.97 (0.59-6.56)	0.27	2.25 (0.64-7.90)	0.21
	Indigenous	35/49 (71.4)	14/49 (28.6)	0.94 (0.49-1.81)	0.86	0.65 (0.29-1.23)	0.30
<b>Household monthly income since COVID started</b>							
	\$0 a \$499	128/198 (64.6)	70/198 (35.3)	1		1	
	\$500 a \$999	98/138 (71.0)	40/138 (29.0)	0.75 (0.47 -1.19)	0.22	0.77 (0.46-1.30)	0.33
	\$1000 a \$2000	124/186 (66.7)	62/186 (33.3)	0.91 (0.60-1.39)	0.68	1.01 (0.62-1.65)	0.96
	\$2001-\$5000	138/181 (76.2)	43/181 (23.8)	0.57 (0.36-0.89)	0.01	0.76 (0.44-1.29)	0.30
	\$5001 and higher	56/69 (81.2)	13/69 (18.8)	0.42 (0.22-0.83)	0.01	0.58 (0.27-1.23)	0.15
<b>Personal loss of income</b>							
	Yes	91/148 (61.5)	57/148 (38.5)	1		1	
	No change in work	390/537 (72.6)	147/537 (27.4)	0.60 (0.41-0.88)	<0.01	0.73 (0.47-1.15)	0.18
	No income pre-COVID-19	67/92 (72.8)	25/92 (27.2)	0.59 (0.34-1.05)	0.07	0.61 (0.32-1.15)	0.13
<b>Alcohol use in the last week</b>							
	Decreased	204/342 (59.6)	138/342 (40.4)	1		1	
	The same	243/302 (80.5)	59/302 (19.5)	0.36 (0.25-0.51)	<0.01	0.38 (0.26-0.55)	<0.01
	Increased	100/131 (76.3)	31/131 (23.7)	0.46 (0.29-0.72)	<0.01	0.53 (0.32-0.85)	0.01
<b>Panel B: Sexual behaviours- individual and with casual partners</b>							
<b>Sexual orientation</b>							
	Heterosexual	425/578 (73.5)	153/578 (26.5)	1		1	
	Bisexual	38/60 (63.3)	22/60 (36.7)	1.61 (0.92-2.80)	0.09	1.37 (0.69-1.87)	0.41
	Lesbian, Gay	46/81 (56.8)	35/81 (43.2)	2.11 (1.31-3.40)	<0.01	1.58 (0.86-2.91)	0.14
	Asexual, pansexual, queer, questioning, another gender	33/51 (64.7)	18/51 (35.3)	1.51 (0.83-2.77)	0.18	0.93 (0.40-2.17)	0.87
<b>Sexual satisfaction</b>							
	Decreased	291/363 (80.2)	72/363 (19.8)	1		1	
	The same	139/204 (68.1)	65/204 (31.9)	1.89	<0.01	1.50	0.10

				(1.28-2.80)		(0.91-2.47)	
	<b>Increased</b>	110/201 (54.7)	91/201 (45.3)	<b>3.34</b> (2.29-4.88)	<0.01	<b>2.99</b> (1.85-4.84)	<b>&lt;0.01</b>
<b>Masturbated</b>							
	<b>Decreased</b>	86/171 (50.3)	85/171 (49.7)	1		1	
	<b>The same</b>	330/386 (85.5)	56/386 (14.5)	<b>0.17 (0.11-0.26)</b>	<b>&lt;0.01</b>	<b>0.34</b> (0.20-0.58)	<b>&lt;0.01</b>
	<b>Increased</b>	130/216 (60.2)	86/216 (39.8)	<b>0.67 (0.45-1.00)</b>	<b>0.05</b>	0.77 (0.41-1.44)	0.17
<b>Virtual-sex use***</b>							
	<b>Decreased</b>	12/90 (13.3)	78/90 (86.7)	32.2 (16.8-61.6)		<b>16.53</b> (7.74-35.27)	
	<b>The same</b>	446/536 (83.2)	90/536 (16.8)	<b>1</b>		<b>1</b>	
	<b>Increased</b>	91/148 (61.5)	57/148 (38.5)	<b>3.10</b> (2.08-4.64)		<b>1.78 (1.10-2.88)</b>	
<b>Pornography use</b>							
	<b>Decreased</b>	51/136 (37.5)	85/136 (62.5)	1		1	
	<b>The same</b>	396/469 (84.4)	74/469 (15.6)	<b>0.11</b> (0.07-0.17)	<b>&lt;0.01</b>	<b>0.06</b> (0.03-0.13)	<b>0.01</b>
	<b>Increased</b>	100/170 (58.8)	70/170 (41.2)	<b>0.42</b> (0.26-0.67)	<b>0.01</b>	0.52 (0.24-1.12)	0.10
<b>Panel C: Long-term partner relationship and sexual behaviours</b>							
<b>Long-term partner cohabitation</b>							
	<b>No, they lived someplace else</b>	200/289 (69.2)	89/289 (30.8)	1		1	
	<b>Yes, the whole time</b>	199/231 (86.1)	32/231 (13.9)	<b>0.36</b> (0.23-0.57)	<0.01	0.61 (0.33-1.11)	0.11
<b>Formal relationship tensions</b>	<b>Part of the time</b>	25/30 (83.3)	5/30 (16.7)	0.45 (0.17-1.21)	0.11	0.84 (0.29-2.46)	0.75
	<b>Less tensions</b>	119/146 (81.5)	27/146 (18.5)	1			
	<b>Tensions about the same</b>	126/146 (86.3)	20/146 (13.7)	0.70 (0.37-1.31)	0.27		
	<b>More tensions</b>	115/144 (79.9)	29/144 (20.1)	1.11 (0.62-1.99)	0.72		
<b>Formal partner emotional support</b>					0.16		
	<b>Decreased</b>	48/65 (73.8)	17/65 (26.2)	1			
	<b>The same</b>	180/214 (84.1)	34/214 (15.9)	0.53 (0.27-1.03)	0.06		
	<b>Increased</b>	133/160 (83.1)	27/160 (16.9)	0.57 (0.29-1.14)	0.11		
<b>Formal partner hugging, kissing, cuddling</b>							
	<b>Decreased</b>	160/209 (76.6)	49/209 (23.4)	1		1	
	<b>The same</b>	128/143 (89.5)	15/143 (10.5)	<b>0.38</b> (0.21-0.71)	<0.01	0.62 (0.27-1.42)	0.26
	<b>Increased</b>	81/100 (81.0)	19/100 (19.0)	0.77 (0.42-1.39)	0.38	1.32 (0.55-3.17)	0.54
<b>Had sex with a long-term partner</b>							
	<b>Decreased</b>	180/233 (77.2)	53/233 (22.8)	1		1	
	<b>The same</b>	142 (87.7)	20/162 (12.3)	<b>0.48</b> (0.27-0.84)	0.02	0.70 (0.33-1.46)	0.34
	<b>Increased</b>	47/57 (82.5)	10/57 (17.5)	0.72 (0.35-1.53)	0.40	0.81 (0.29-2.22)	0.68

\*Reports of increased casual sex not included (N=21) \*\*Adjusted for sex and area of residence (rural vs urban); \*\*\*virtual-sex is a composite variable of cybersex use and/or sexting use; \*\*\*\*independent correlate

**Supplementary Table 1:** Comparison of ISHARE-Panama sample to Census projected 2020 population 18 years and older

<i>Province/ Indigenous Comarca</i>	Census projected population per province or Comarca [1]		ISHARE-Panama Sample	
	<b>Raw population 18 years and older</b>	<b>% of the population</b>	<b>Total number recruited</b>	<b>% of the total sample</b>
<b><i>Total population</i></b>	2937150		960	
<b><i>Bocas</i></b>	102885	3.5%	15	1.6%
<b><i>Chiriquí</i></b>	311118	10.6%	82	8.5%
<b><i>Coclé</i></b>	183592	6.2%	46	4.8%
<b><i>Colón</i></b>	191773	6.5%	52	5.4%
<b><i>Comarca Ngäbe-Buglé</i></b>	144423	4.9%	58	6.0%
<b><i>Herrera</i></b>	85178	2.9%	19	2.0%
<b><i>Los Santos</i></b>	70372	2.4%	14	1.5%
<b><i>Panama and Panama Oeste</i></b>	1611313	54.9%	643	67.0%
<b><i>Veraguas</i></b>	166561	5.7%	26	2.7%
<b><i>Comarca Guna</i></b>	26286	0.9%	0	0.0%
<b><i>Darien</i></b>	36279	1.2%	2	0.2%
<b><i>Comarca Embera-Wounaan</i></b>	7370	0.2%	1	0.1%

Reference to Supplementary table 1:

1. Instituto Nacional de Estadística y Censo. Boletín 15. Estimaciones y proyecciones de la población en la república, provincia, comarca indígena por distrito según sexo y edad 2010-2020. 2010.

**Supplementary Table 2. Sexual behaviours three months before COVID-19 social distancing measures in Panama, Panama, 2020.**

		All participants		Cis-women		Cis-men		Non-binary/another gender	
		N	%	N	%	N	%	N	%
<b>Panel A: Individual and casual partner behaviours</b>									
<b>Sexual satisfaction</b>		N=		N=463		N=315		N=59	
	Satisfied or somewhat	394	47.1	228	49.2	138	43.8	28	47.5
	Not very satisfied or not satisfied at all	443	52.9	235	50.8	177	56.2	31	52.5
<b>Sexual problems*</b>		N=594		N=355		N=195		N=44	
	Never	309	52.0	171	48.2	109	55.9	29	65.9
	1 or more times/month	285	48.0	184	51.8	86	44.1	15	34.1
<b>Masturbated</b>		N=838		N=467		N=313		N=58	
	Never	186	22.2	131	28.0	36	11.5	19	32.8
	1 or more times/month	652	77.8	336	72.0	277	88.5	39	67.2
<b>Pornography use</b>		N=839		N=466		N=313		N=60	
	Never	245	29.2	190	40.8	33	10.5	22	36.7
	1 or more times/month	594	70.8	276	59.2	280	89.5	38	63.3
<b>Virtual sex **</b>		N=845		N=470		N=315		N=60	
	Never	453	53.6	289	61.5	131	41.6	33	55.0
	1 or more times/month	392	46.4	181	38.5	184	58.4	27	45.0
<b>Had a casual sex encounter</b>		N=837		N=466		N=312		N=59	
	Never	637	76.1	381	81.8	211	67.6	45	76.3
	1 or more times/month	200	23.9	85	18.2	101	32.4	14	23.7
<b>Condom use with a casual partner</b>		N=201		N=85		N=103		N=13	
	Inconsistently or never	88	43.8	42	49.4	40	38.8	6	46.1
	Always	113	56.2	43	50.6	63	61.2	7	53.9
<b>PANEL B: Long-term relationship</b>									
<b>Relationship tensions ***</b>		N=503		N=311		N=162		N=30	
	Never	146	29.0	89	28.6	46	28.4	11	36.7
	1 or more times/month	357	71.0	222	71.4	116	71.6	19	63.3
<b>Sex with a long-term partner</b>		N=596		N=358		N=194		N=44	
	Never	64	10.7	26	7.3	34	17.5	4	9.1
	1 or more times/month	532	89.3	332	92.7	160	82.5	40	90.9
<b>Condom use with long-term partner</b>		N=595		N=357		N=194		N=44	
	Inconsistently or never	489	82.2	300	84.0	151	77.8	38	86.4
	Always	106	17.8	57	16.0	43	22.2	6	13.6

\*\*Sexual problems are individual or partners issues including erectile dysfunction or inhibited desire, orgasm

\*\*virtual-sex is a composite variable of cybersex use and/or sexting use;

\*\*\*Long-term partner relationship tensions **Fight with long-term partner**

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### Key Messages:

- During Panama's COVID-19 social distancing measures, we found a decrease in sexual activity among some individuals, especially casual sex encounters among cis-men and participants of Afro-descendent ethnicity
- Virtual sex (sexting and cybersex) use was common before COVID-19 social distancing measures. Reported changes in this practice were associated with a decrease in casual sex.
- Condom access, STI and HIV testing, and HIV care were seriously interrupted during COVID-19 social distancing measures in Panama.

### Contributorship statement:

Authors AG, JTE, KM, CPE, MM, JK, GCT, MdA, AM and JT contributed to the conception of the international and national versions of the I-SHARE project and survey instrument. Data collection was performed by AG, JK, GCT, MdA, AM and JMP. Data curation and analysis was performed by AG, JTE, JT, PM. AG drafted the manuscript, all authors contributed to critical revisions and final approval. AG is responsible for the overall content as a guarantor.

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