

## Analysis of the impact of COVID-19 pandemic on women's care in an abortion situation in Latin America and the Caribbean

Análisis del impacto de la pandemia del COVID-19 en la atención de las mujeres en situación de aborto en América Latina y el Caribe

Análise do impacto da pandemia de COVID-19 sobre a atenção a mulheres em situação de aborto na América Latina e Caribe

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## Abstract

**Objective:** to understand the influence of the COVID-19 pandemic on aspects of quality of care provided to women in abortion situations in sentinel centers of the CLAP MUSA-Network (a multicenter network with international cooperation with the aim of encouraging good practices in Latin America and the Caribbean). **Methods:** cross-sectional study between January/2017 and December/2021 with women of any age admitted for abortion or miscarriage. We analyzed the total number of cases and the proportion of legal abortions. The dependent variables were complications and use of contraceptives after abortion. The independent variables were COVID-19 pandemic, clinical and sociodemographic data. Statistical analysis was carried out using linear regression, multiple Poisson regression, Cochran-Armitage, chi-square, Mann-Whitney and Cohen tests. **Results:** we analyzed data from 93689 women assisted in 12 sentinel centers of the CLAP MUSA-Network, 64.55% in the pre-pandemic period (NP) and 35.45% in the pandemic period (PP) (22.73% received post-abortion care and 77.27% legal abortion). We found no differences in the number of cases over the period, regardless of the legal context. We observed a significant increase in the proportion of legal

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abortions in liberal and moderate contexts. In NP, 46.46% of women underwent medical abortion, while 62.18% of women underwent medical abortion in PP (h-Cohen 0.32). We found no increase in the number of complications during PP. In NP, 79.12% started contraceptives after abortion, while in PP, 70.39% started contraceptives after abortion (h-Cohen 0.20). **Conclusion:** the COVID-19 pandemic was not associated with a decrease in the number of cases, a decrease in the proportion of legal interruptions, or an increase in complications in sentinel centers of the CLAP MUSA-Network.

### Keywords

Pregnancy, Unplanned. Pregnancy in Adolescence. Pregnancy, Unwanted. Abortion, Spontaneous.

### Resumo

**Objetivo:** compreender a influência da pandemia de COVID-19 nos aspectos da qualidade da assistência prestada às mulheres em situação de abortamento nos centros sentinela da Rede CLAP-MUSA, uma rede multicêntrica com cooperação internacional visando encorajar boas práticas na América Latina e no Caribe. **Metodologia:** estudo transversal entre janeiro/2017 e dezembro/2021 com mulheres de qualquer idade admitidas por abortamentos espontâneos ou induzidos. Analisamos o número total de casos e a proporção de abortos legais. As variáveis dependentes foram complicações e uso de anticoncepcionais após o aborto. As variáveis independentes foram a pandemia de COVID-19, dados clínicos e sociodemográficos. A análise estatística foi realizada por meio de regressão linear, regressão múltipla de Poisson, testes de Cochran-Armitage, qui-quadrado, Mann-Whitney e Cohen. **Resultados:** foram analisados dados de 93.689 mulheres, atendidas em 12 centros sentinelas da Rede CLAP-MUSA, 64,55% no período pré-pandêmico (NP) e 35,45% no período pandêmico (PP) (22,73% receberam atendimento pós-aborto e 77,27%, aborto legal). Não encontramos diferenças no número de casos ao longo do período, independentemente do contexto legal. Observamos um aumento significativo na proporção de abortos legais em contextos liberais e moderados. No NP, 46,46% das mulheres realizaram aborto medicamentoso, enquanto 62,18% das mulheres realizaram aborto medicamentoso no PP (h-Cohen 0,32). Não encontramos aumento no número de complicações durante o PP. No NP, 79,12% iniciaram anticoncepcionais após o aborto, enquanto no PP, 70,39% iniciaram anticoncepcionais após o aborto (h-Cohen 0,20). **Conclusão:** a pandemia de COVID-19 não se associou à diminuição do número de casos, à diminuição da proporção de interrupções legais ou ao aumento de complicações nos centros sentinelas da Rede CLAP-MUSA.

### Palavras-chave

Gravidez não Planejada. Gravidez na Adolescência. Gravidez não Desejada. Aborto Espontâneo.

### Resumen

**Objetivo:** comprender la influencia de la pandemia de COVID-19 en aspectos de la calidad de la atención brindada a las mujeres en situación de aborto en los centros centinela de la Red CLAP-MUSA (una red multicéntrica de cooperación internacional con el objetivo de fomentar buenas prácticas en América Latina y el Caribe). **Metodología:** estudio transversal entre enero/2017 y diciembre/2021 con mujeres de cualquier edad ingresadas para abortos espontáneos o inducidos. Se analizó el número total de casos y la proporción de abortos legales. Las variables dependientes fueron las complicaciones y el uso de anticonceptivos después del aborto. Las variables independientes fueron pandemia de COVID-19, datos clínicos y sociodemográficos. El análisis estadístico se realizó mediante regresión lineal, regresión múltiple de Poisson, pruebas de Cochran-Armitage, chi-cuadrado, Mann-Whitney y Cohen. **Resultados:** se analizaron datos de 93689 mujeres atendidas en 12 centros centinela de la Red CLAP-MUSA, 64,55% en el período prepandemia (NP) y 35,45% en el período pandemia (PP) (22,73% recibieron atención postaborto y 77,27% aborto legal). No encontramos diferencias en el número de casos durante el período, independientemente del contexto legal. Observamos un aumento significativo en la proporción de abortos legales en contextos liberales y moderados. En NP, el 46,46% de las mujeres se sometieron al aborto con medicamentos, mientras que el 62,18% de las mujeres se sometieron al aborto con medicamentos en PP (h-Cohen 0,32). No encontramos aumento en el número

de complicaciones durante el PP. En NP, 79,12% inició anticonceptivos después del aborto, mientras que en PP, 70,39% inició anticonceptivos después del aborto (h-Cohen 0,20). **Conclusión:** la pandemia de COVID-19 no se asoció con una disminución en el número de casos, una disminución en la proporción de interrupciones legales o un aumento en las complicaciones en los centros centinela de la Red CLAP-MUSA.

### **Palabras clave**

Embarazo no Planeado. Embarazo en Adolescencia. Embarazo no Deseado. Aborto Espontáneo.

### **Introduction**

The COVID-19 pandemic was declared by the World Health Organization on 03/11/2020 (1). Despite the decrease in cases in recent months as a result of mass vaccination, the impact of changes in recent years has been felt throughout the world. Understanding how a disruptive agent on a global scale acts on health systems, more specifically on aspects related to sexual and reproductive health, is essential for us to plan actions to combat the next public health emergencies (2).

The changes that have occurred in various aspects of daily life have directly and indirectly influenced health services since the first months of the COVID-19 pandemic. Considering the internal context of the institutions, the prioritization of human resources, personal protective equipment and hospital supplies for the treatment of the large number of cases of respiratory syndrome, caused diseases with a less acute evolution to have their diagnosis and treatment postponed (3). In some hospitals, rooms intended for carrying out surgical procedures were converted into intensive care beds, limiting the possibility of surgical treatment (4). The consequences of these changes were clearer in low-income countries that already had health systems with worse conditions to provide adequate care to the population (2). In this context, guaranteeing the continuity of the provision of sexual and reproductive rights, such as the right to abortion and access to contraceptive methods, has been a challenge in several countries. In early 2020, an international organization estimated that up to 2.7 million unsafe abortions would take place as a result of the effects of the COVID-19 pandemic on sexual and reproductive rights (5).

Considering the context outside health institutions, several measures to contain the movement of people within urban agglomerations were taken with the aim of reducing the possibility of spreading SARS-COV2. Among these measures, lockdown periods were adopted in several countries (6). The availability of public transport has been reduced, limiting the possibility of moving vulnerable people living in more remote locations. Often, people were instructed to seek health services only in urgent and emergency cases. As a result, conditions that are easily treated at the beginning of their evolution may have had more severe outcomes due to a longer time since the onset of symptoms (7). This may have occurred with women who needed post-abortion care. A recent study has shown that COVID-19 infection carries a higher risk of first-trimester miscarriage in low-income countries (8). It is possible that women with an incomplete abortion may have had a greater number of complications resulting from a possible delay in providing adequate treatment.

The CLAP MUSA-Network<sup>5</sup> is made up of several health institutions in Latin America and the Caribbean that aim to strengthen epidemiological surveillance and develop a critical mass of trained

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professionals in sexual and reproductive health (9). The COVID-19 pandemic caused changes in the flow of care for women in an abortion situation in the hospitals that make up the network, both externally and internally. With the aim of understanding the influence of these changes on some aspects of the quality of care provided in hospitals in the CLAP MUSA Network, we carried out an epidemiological surveillance study. With this, we hope to aggregate data to help understand the influence of secondary effects related to the rapid spread of a global infectious agent. After all, the next pandemic may be just around the corner.

## Methods

The CLAP MUSA-Network is a multicenter network with international cooperation created by the Latin American Centre of Perinatology (CLAP) in 2015, with the aim of encouraging good practices in the care of women in abortion situations in Latin America and the Caribbean (9). Participating hospitals are called *sentinel centers*, and the network currently has 29 sentinel centers located in 13 countries. The CLAP MUSA Network compiles data related to the pregnancy-puerperal cycle through the Perinatal Computerized System (SIP), a software developed by CLAP. SIP is a computer program originally developed for use in obstetrics and neonatology services (10). More recently, the SIP-abortion (SIP-A) was adapted to the SIP to be used by the sentinel centers of the CLAP MUSA Network as an assistance tool and to collect data from women in abortion situations. Data are regularly sent to the coordinating center, which processes indicators and provides feedback for each sentinel center on the frequency of use of practices recommended by the most recent WHO guidelines. All data is kept confidential and anonymized. Details on the network's operating scheme were recently published (9).

### Data collection

A cross-sectional study with prospective data collection was carried out between January 1, 2017 and December 31, 2021. The data entered in SIP-A were converted to an *.xls* database. Women admitted for abortion of any cause and in any age group, attended at sentinel centers of the CLAP MUSA-Network, who reported cases during all semesters of the analyzed period, were included. Women with ectopic and molar pregnancies were excluded from the analysis. With this, we analyzed data from 93,689 women assisted in 12 sentinel centers of the CLAP MUSA Network, located specifically in the following countries: Argentina, Bolivia, Brazil, Colombia, Cuba, Dominican Republic, Honduras and Panama. The study was exempt from ethical approval by the PAHO Ethics Committee because it is an epidemiological surveillance, and the data are anonymized (PAHOERC Ref. No: PAHOERC.0570.01).

### Dependent variables

For this study, the following dependent variables were considered:

- Complications in cases of legal termination of pregnancy (yes/no), defined as the presence of any of the following conditions: genital infection, pelvic infection, sepsis, excessive bleeding,

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hypovolemic shock, uterine/vaginal/pelvic injury, intraoperative complications, need for of hysterectomy.

- Complications in cases of postabortion care (abortion from any cause, excluding cases of legal termination of pregnancy) (yes/no), defined as the presence of any of the following conditions: genital infection, pelvic infection, sepsis, excessive bleeding, hypovolemic shock, uterine/vaginal/pelvic injury, intraoperative complications, need for hysterectomy.
- Severe maternal Outcome (yes/no): presence of death and/or *near miss* following the criteria defined by the WHO (12).
- Use of contraceptive methods soon after abortion (yes/no). The methods considered were intrauterine devices, implants, injectable hormones, oral hormones, hormonal patches, hormonal vaginal ring, female or male sterilization. The use of barrier methods only was not considered as a contraceptive method.

### *Independent variables*

- COVID-19 pandemic: defined as pre-pandemic period (NP) (until 03/10/2020) and pandemic period (PP) (after 03/11/2020) (1).

### *Control variables*

The control variables were the legal context of each country regarding abortion (liberal: Argentina/Colombia/Cuba, moderate: Bolivia/Brazil/Panama, restrictive: Dominican Republic/Honduras); age (years); literate (yes/no); schooling (illiterate+first grade/high school+university); lives alone (yes/no); number of births; number of abortions; body mass index (BMI); active smoking (yes/no); illicit drug use (yes/no); intended pregnancy (yes/no); unintended pregnancy and non-use of contraceptive methods (yes/no); unintended pregnancy and contraceptive use failure (yes/no); date of resolution of the last pregnancy; gestational age in weeks; transport time to the health unit (expressed in minutes); symptomatology time (expressed in hours); need for uterine evacuation (yes/no); type of uterine evacuation (curettage or curettage and medication / medication only / manual vacuum aspiration or electric aspirator), number of the following social vulnerability factors (be less than 20 years old, have studied up to primary school at most, have a history of gender violence, live alone, unintended pregnancy) categorized into (0, 1,  $\geq 2$ ).

### *Statistical analysis*

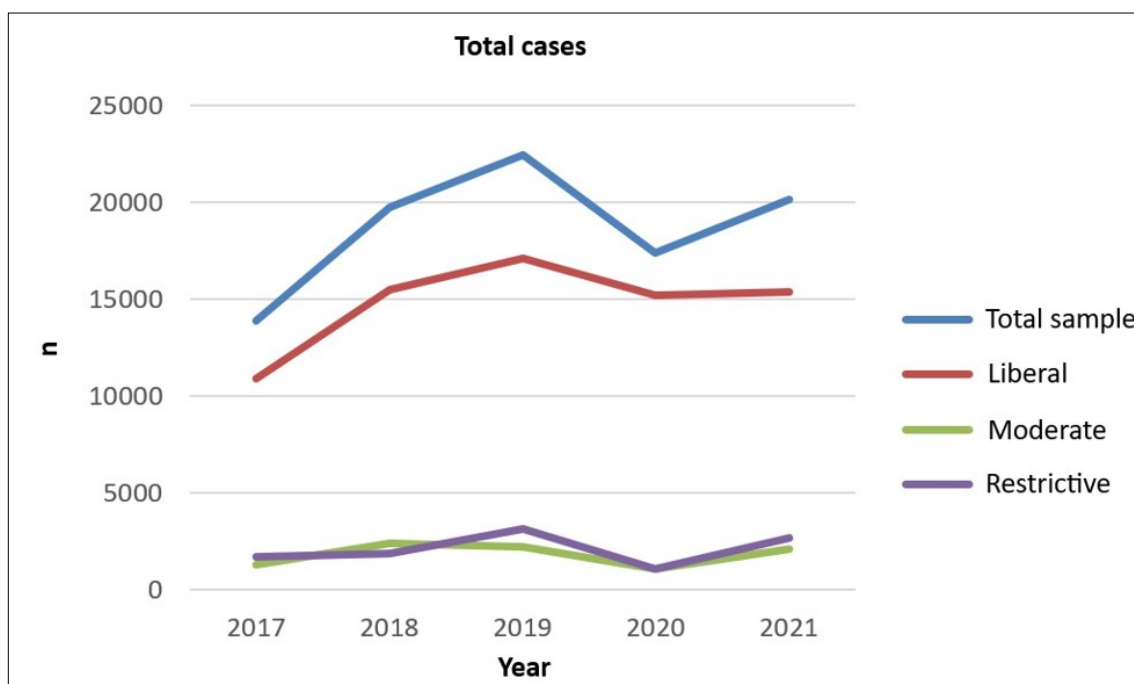
Initially, a descriptive analysis of the data was carried out. For quantitative variables, mean and standard deviation were calculated. For categorical variables, relative frequencies were calculated. To find out if there were changes in the clinical and sociodemographic characteristics considering the pre-pandemic period (NP) and the pandemic period (PP), the Mann-Whitney test was performed for quantitative variables and the chi-square for categorical variables. As this is a study with a large database, we used Cohen's *d* test to calculate the *effect size* for quantitative variables and Cohen's *h* test to calculate the effect size for categorical variables. Values of Cohen's *d* or *h* between 0 and 0.19 are considered negligible, values between 0.20 and 0.49 are considered small, values between 0.50 and 0.79 are considered moderate and values greater than or equal to 0.80 are considered large effect sizes (13). We performed linear regression to find out whether there was a trend change in the absolute

number of cases treated per year. Subsequently, we performed Cochran-Armitage trend tests with annual analysis to assess whether there were changes in the following proportions: legal termination of pregnancy/post-abortion care (abortion from any cause, excluding cases of legal termination), changes in complication rates after legal termination, changes in complication rates in post-abortion care cases, changes in the frequency of SMO and changes in the frequency of use of contraceptive methods soon after abortion. Linear regression and Cochran-Armitage trend tests were performed considering the total sample and by countries grouped according to legal context. Finally, to assess the factors independently associated with the presence of complications after legal termination of pregnancy, complications after post-abortion care (abortion from any cause, excluding cases of legal termination) and SMO, multiple Poisson regression models were constructed with stepwise criteria for variable selection. The level of statistical significance was set at 5%. The software used for data analysis was *The SAS System for Windows (Statistical Analysis System)*, version 9.4, SAS Institute Inc, 2002-2012, Cary, NC, USA.

## Results

During the analyzed period, 93,689 women in an abortion situation were included, 60,473 (64.55%) in the pre-pandemic period (NP) and 33,216 (35.45%) in the pandemic period (PP). Of the total number of women included, 21293 (22.73%) received post-abortion care and 72396 (77.27%) legal terminations of pregnancy. By performing linear regression, we did not observe changes in the absolute number of cases considering the total sample ( $B=1014.50$ ;  $E.P.(B)=1025.84$ ;  $t=0.99$ ;  $P=0.396$ ) and in any of the legal contexts: liberal ( $B= 872.40$ ;  $E.P.(B)=684.27$ ;  $t=1.27$ ;  $P=0.292$ ), moderate ( $B=24.60$ ;  $E.P.(B)=213.46$ ;  $t=0.12$ ;  $P=0.916$ ) and restrictive ( $B=117.50$ ;  $E.P.(B) =287.36$ ;  $t=0.41$ ;  $P=0.710$ ) (Figure 1).

**Figure 1.** Total number of cases considering the legal context



Source: CLAP MUSA-Network.

Considering the NP, the mean age of the women was 26.3 ( $\pm 6.84$ ) years, while in the PP the mean age was 26.64 ( $\pm 6.70$ ) ( $p < 0.01$ ; d Cohen 0.05). The mean gestational age was 8.05 ( $\pm 3.50$ ) in the NP and 7.98 ( $\pm 3.55$ ) in the PP ( $p < 0.01$ ; d Cohen 0.02). The mean number of previous deliveries was 0.93 ( $\pm 1.16$ ) in the NP and 0.91 ( $\pm 1.12$ ) in the PP ( $p = 0.46$ ; d Cohen 0.02). The mean BMI was 23.84 ( $\pm 3.99$ ) in the NP and 24.03 ( $\pm 3.88$ ) in the PP ( $p < 0.01$ ; d Cohen 0.05). The mean duration of symptoms before hospital admission was 37.87 ( $\pm 80.92$ ) hours in NP and 38.98 ( $\pm 93.70$ ) hours in PP ( $p = 0.82$ ; d Cohen 0.01). Mean transport time to the hospital was 84.81 ( $\pm 1315.0$ ) minutes in the NP and 88.48 ( $\pm 1072.1$ ) minutes in the PP ( $p < 0.01$ ; d Cohen 0.00). In the NP, 34.77% of the women were married or in a stable relationship, while in the PP, 32.86% were married or in a stable relationship ( $p < 0.01$ ; h Cohen 0.04). In the NP, 5.78% of the women lived alone, while 5.82% lived alone in the PP ( $p = 0.80$ ; h Cohen 0.00). In NP 93.08% of pregnancies were unintended, while in PP 94.11% of pregnancies were unintended ( $p < 0.01$ ; h Cohen 0.04). In the NP, 86.50% of the women who did not want to get pregnant did not use contraceptive methods, while in the PP, 90.57% of the women who did not want to get pregnant did not use contraceptives ( $p < 0.01$ ; h Cohen 0.13). In the NP, 30.90% of the women had two or more social vulnerability factors, while in the PP, 25.98% of the women had two or more social vulnerability factors ( $p < 0.01$ ; h Cohen 0.11). In NP, 2.32% of women underwent uterine curettage, while in PP, 2.14% of women underwent curettage ( $p < 0.01$ ; h Cohen 0.01). In NP, 46.46% of women underwent uterine evacuation with medication only, while 62.18% of women underwent uterine evacuation with medication only in PP ( $p < 0.01$ , h Cohen 0.32). In NP, 51.23% of women underwent uterine aspiration, while 35.68% of women underwent uterine aspiration in PP ( $p < 0.01$ , h Cohen 0.32) (Table 1).

**Table 1.** Clinical and sociodemographic characteristics of women in abortion situations (n=93,689)

Variables	COVID-19 pandemic		Total	p-value	h-Cohen
	NP n (%)	PP n (%)			
<b>Legal context</b>				<0.01	0.06
<i>Liberal</i>	47,279 (78.18)	26,788 (80.65)	74,067		
<i>Moderate</i>	6,195 (10.24)	2,911 (8.76)	9,106		
<i>Restrictive</i>	6,999 (11.57)	3,517 (10.59)	10,516		
<b>Abortion situation</b>				<0.01	0.10
<i>Legal</i>	45,863 (75.84)	26,533 (79.88)	72,834		
<i>Post-abortion care</i>	14,610 (24.16)	6,683 (20.12)	22,097		
<b>Marital status<sup>a</sup></b>				<0.01	0.04
<i>With partner</i>	20,875 (34.77)	10,835 (32.86)	31,710		
<i>Without partner</i>	39,171 (65.23)	22,140 (67.14)	61,311		
<b>Lives alone<sup>b</sup></b>				0.80	0.00
<i>Yes</i>	3,370 (5.78)	1,853 (5.82)	5,223		
<i>No</i>	54,963 (94.22)	30,005 (94.18)	84,968		

<b>Intended pregnancy<sup>c</sup></b>				<0.01	0.04
Yes	4,124(6.92)	1,914 (5.89)	6,038		
No	55,456 (93.08)	30,597(94.11)	86,053		
<b>Use of contraceptive (unintended pregnancies)<sup>d</sup></b>				<0.01	0.13
Yes	6,149 (13.50)	2,851 (9.43)	9,000		
No	39,394 (86.50)	27,369 (90.57)	66,763		
<b>Social vulnerability factors<sup>e</sup></b>				<0.01	0.11
0	2,969 (4.91)	1,472 (4.43)	4,441		
1	38,816 (64.19)	23,113 (69.59)	61,929		
≥2	18,688 (30.90)	8,629 (25.98)	27,317		
<b>Uterine evacuation<sup>f</sup></b>				<0.01	0.02
Yes	59,490 (98.71)	32,494 (98.92)	91,984		
No	780 (1.29)	354 (1.08)	1,134		
<b>Type of uterine evacuation</b>				<0.01	0.32
<i>Curettage</i>	1,378 (2.32)	695 (2.14)	2,073		
<i>Medication only</i>	27,637 (46.46)	20,206 (62.18)	47,843		
<i>Uterine aspiration</i>	30,475 (51.23)	11,593 (35.68)	42,068		

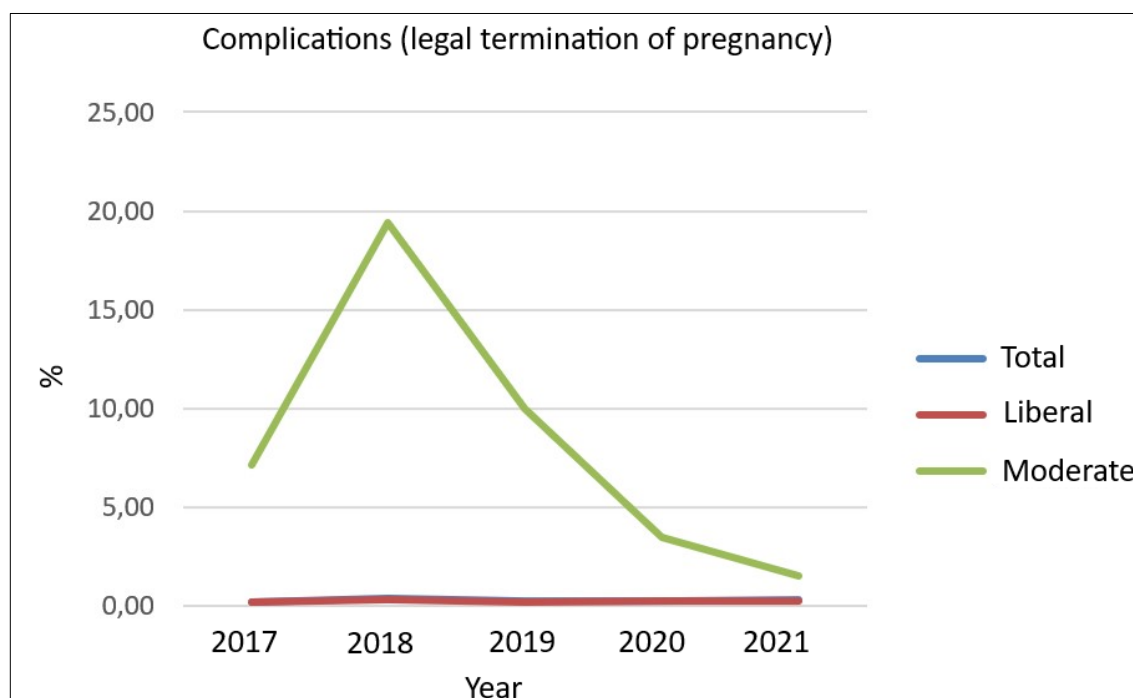
Missing data: a=668, b=3498, c=1598, d=17926, e=2, f=571.

Source: CLAP MUSA-Network.

Since the beginning of the period evaluated, 72,396 women underwent legal terminations of pregnancy. In the NP, 75.84% of the women treated at the sentinel centers of the CLAP MUSA Network underwent legal termination, while in the PP, 79.88% of the women underwent legal termination ( $p < 0.01$ ,  $h$ -Cohen 0.10). We performed a trend test considering the entire period evaluated. We observed a significant increase in the proportion of legal interruptions considering the total sample (COCHRAN-ARMITAGE TEST:  $Z = 10.81$ ;  $P < 0.001$ ). When we analyze the countries according to the legal context, we observe a significant increase in the proportion of legal interruptions, both in the liberal context ( $Z = 17.63$ ;  $P < 0.001$ ) and in the moderate context ( $Z = 6.77$ ;  $P < 0.001$ ). Since the beginning of the evaluated period, 201 women (0.28%) had complications related to the legal termination of pregnancy. Among these, 16.41% had some complication at the time of hospital admission such as infection, excessive bleeding or hypovolemic shock). The majority (69.65%) of complications in cases of legal interruption occurred intraoperatively (surgical or anesthetic). We did not observe any trend change in complications after legal termination of pregnancy during the period evaluated considering the total sample (COCHRAN-ARMITAGE TEST:  $Z = -0.10$ ;  $P = 0.92$ ). When analyzing the countries according to the legal context, we did not observe a change in the trend in complications after the legal termination of pregnancy in the liberal context ( $Z = 0.65$ ;  $P = 0.51$ ). We observed a downward trend in the number of complications after legal termination of pregnancy in the moderate context ( $Z = -3.56$ ;  $P < 0.01$ ) (Figure 2).



**Figure 2.** Complications in legal termination of pregnancy



Source: CLAP MUSA-Network.

Our multiple Poisson regression model showed that the variables independently associated with complications in cases of legal termination of pregnancy were being admitted to a hospital located in a country with a moderate legal context (PR 25.78; 95% CI 8.93 – 74.47) and having a higher gestational age (PR 1.219; 95% CI 1.187 – 1.252). Performing uterine evacuation exclusively with medication was associated with a lower prevalence of complications (PR 0.20; 95% CI 0.13 – 0.30) (Table 2).

**Table 2.** Multiple regression analysis for complications in legal interruption of pregnancy – Poisson regression model (n=70,763)

Variables	Categories	p-value	PR*	95% CI PR**
Gestational age	Continuous variable (weeks)	<0.001	1.219	1.187-1.252
Legal context	Liberal (ref.***)	–	1.00	–
	Moderate	<0.001	25.78	8.93-74.47
Type of uterine evacuation	Uterine aspiration (ref.***)	–	1.00	–
	Curettage	0.06	0.32	0.10-1.05
	Medication only	<0.001	0.20	0.13-0.30

\* Prevalence Ratio for complications; (n=70,587 no and n=176 yes).

\*\* 95% confidence interval for prevalence ratio. Stepwise criterion for Variable selection.

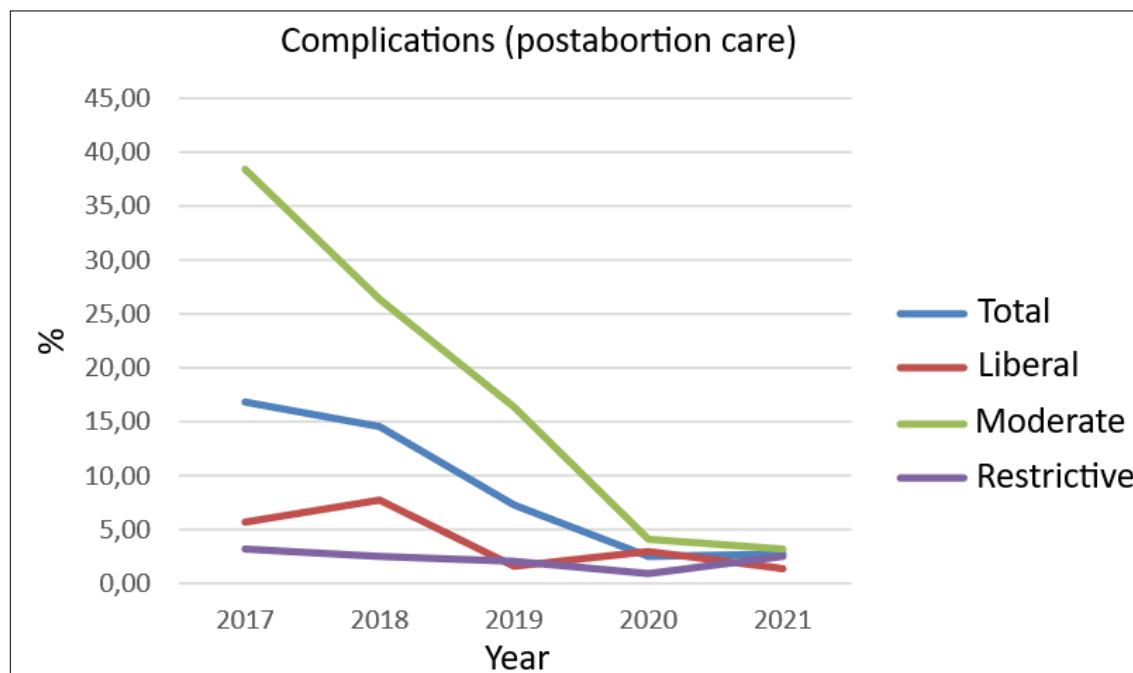
\*\*\* Reference level.

Source: CLAP MUSA-Network.

Since the beginning of the period evaluated, 1907 women (9.03%) had complications related to post-abortion care (abortion of any cause, excluding cases of legal interruption of pregnancy). Among these, the majority (95.59%) had some complication at the time of hospital admission (such as infection, excessive bleeding or hypovolemic shock) and 3.82% had surgical or anesthetic

intraoperative complications (some women had more than one type of complication). We observed a significant decrease in the number of complications in postabortion care considering the total sample (COCHRAN-ARMITAGE TEST:  $Z=-27.19$ ;  $P<0.001$ ). When analyzing the countries according to the legal context, we observed a significant decrease in the number of complications in the liberal ( $Z=-4.09$ ;  $P<0.001$ ) and moderate ( $Z=-29.05$ ;  $P<0.001$ ) contexts. There was no change in the trend in the occurrence of post-abortion complications in countries with a restrictive context (COCHRAN-ARMITAGE TEST:  $Z=-1.81$ ;  $P=0.07$ ) (Figure 3).

**Figure 3.** Complications in postabortion care



Source: CLAP MUSA-Network.

Our multiple Poisson regression model showed that the variables independently associated with complications in postabortion care were being admitted in the pre-pandemic period (PR 4.36; 95% CI 3.69 – 5.15); in a hospital located in a country with a liberal (PR 1.41; 95% CI 1.06 – 1.88) or moderate (PR 8.20; 95% CI 7.00 – 9.61) legal context; undergoing curettage (PR 1.25; 95% CI 1.07 – 1.44); having a higher gestational age (PR 1.034; 95% CI 1.021 – 1.047); having a higher number of births (PR 1.183; 95% CI 1.140 – 1.228) and having higher education (PR 1.17; 95% CI 1.02 – 1.34). Older age (PR 0.964; 95% CI 0.956 – 0.973) and performing uterine evacuation exclusively with medication was associated with a lower prevalence of complications (PR 0.53; 95% CI 0.41 – 0.70) (Table 3).

**Table 3.** Multiple regression analysis for complications in postabortion care – Poisson regression model (n=16,571)

Variables	Categories	p-value	PR*	95% CI PR**
Legal context	Restrictive (ref.***)	–	1.00	–
	Liberal	<b>0.017</b>	1.41	1.06-1.88
	Moderate	<b>&lt;0.001</b>	8.20	7.00-9.61
Covid-19 pandemic	Pandemic (ref.***)	–	1.00	–
	Pre-pandemic	<b>&lt;0.001</b>	4.36	3.69-5.15
Gestational age	Continuous variable (weeks)	<b>&lt;0.001</b>	1.034	1.021-1.047

Type of uterine evacuation	Aspiration (ref.***)	–	1.00	–
	Curettage	<b>0.004</b>	1.25	1.07-1.44
	Medication only	<b>&lt;0.001</b>	0.53	0.41-0.70
Age	Continuous variable (years)	<b>&lt;0.001</b>	0.964	0.956-0.973
Number of births	Continuous variable	<b>&lt;0.001</b>	1.183	1.140-1.228
Schooling	illiterate+first grade (ref.***)	–	1.00	–
	high school+university	<b>0.021</b>	1.17	1.02-1.34

\* Prevalence Ratio for complications; (n=14,814 no and n=1,757 yes).

\*\* 95% CI PR = 95% confidence interval for prevalence ratio. Stepwise criterion for variable selection.

\*\*\* Reference level.

Source: CLAP MUSA-Network.

Since the beginning of the evaluation period, 26592 women had complete data for the assessment of severe maternal morbidity according to WHO criteria. Among these, 192 women met the criteria for severe maternal morbidity, with 8 deaths and 184 near misses. In the NP, 0.90% of the women presented criteria for SMO, while in the PP, 0.37% of the women presented criteria for SMO ( $p < 0.01$ ,  $h$ -Cohen 0.07). We also performed a trend test considering the entire period evaluated. Similar to what was observed in the analysis of postabortion complications, we observed a significant decrease in the number of SMO considering the total sample (COCHRAN-ARMITAGE TEST:  $Z = -7.15$ ;  $P < 0.001$ ). When analyzing countries according to legal context, we observed a significant decrease in the number of SMO in liberal ( $Z = -10.98$ ;  $P < 0.001$ ) and moderate ( $Z = -3.66$ ;  $P < 0.001$ ) contexts. Countries with a restrictive legal context did not show a tendency to change the occurrence of SMO (COCHRAN-ARMITAGE TEST:  $Z = -0.50$ ;  $P = 0.61$ ). Our multiple Poisson regression model showed that the variables independently associated with SMO were higher gestational age (PR 1.052; 95% CI 1.016 – 1.088); greater number of births (PR 1.255; 95% CI 1.151 – 1.369); living alone (PR 3.51; 95% CI 1.69 – 7.29); postabortion care (not legal termination of pregnancy) (PR 2.28; 95% CI 1.32 – 3.94) and performing uterine curettage (PR 2.41; 95% CI 1.47 – 3.96) (Table 4).

**Table 4.** Multiple regression analysis for severe maternal outcome – Poisson regression model (n=19,910)

Variables	Categories	p-value	PR*	95% CI PR**
Type of uterine evacuation	Aspiration (ref.***)	–	1.00	–
	Curettage	<b>&lt;0.001</b>	2.41	1.47-3.96
	Medication only	0.055	0.55	0.29-1.01
Number of births	Continuous variable	<b>&lt;0.001</b>	1.255	1.151-1.369
Lives alone	No (ref.***)	–	1.00	–
	Yes	<b>&lt;0.001</b>	3.51	1.69-7.29
Abortion situation	Legal interruption (ref.***)	–	1.00	–
	Postabortion care	<b>0.003</b>	2.28	1.32-3.94
Gestational age	Continuous variable (weeks)	<b>0.004</b>	1.052	1.016-1.088

\* Prevalence Ratio for SMO; (n=19,779 no and n=131 yes).

\*\* 95% CI PR = 95% confidence interval for prevalence ratio. Stepwise criterion for variable selection.

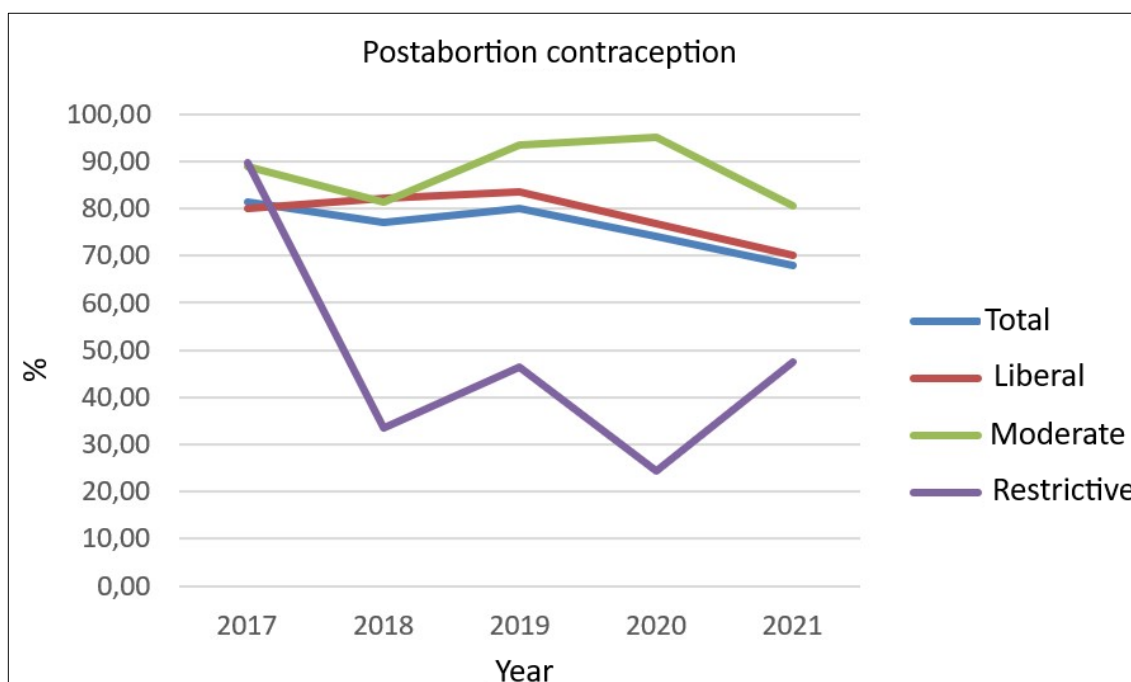
\*\*\* Reference level.

Source: CLAP MUSA-Network.

Since the beginning of the evaluated period, 76.34% of the women started using a contraceptive soon after abortion. In the NP, 79.12% started contraceptive, while in the PP, 70.39% started contraceptive soon after abortion ( $p < 0.01$ ,  $h$ -Cohen 0.20). We also performed a trend test considering

the entire period evaluated. We observed a significant decrease in the use of contraceptives soon after abortion during the analyzed period when considering the total sample (COCHRAN-ARMITAGE TEST:  $Z=-24.62$ ;  $P<0.001$ ) (Figure 4). This downward trend was observed in liberal (COCHRAN-ARMITAGE TEST:  $Z=-19.35$ ;  $P<0.001$ ) and restrictive (COCHRAN-ARMITAGE TEST:  $Z=-13.22$ ;  $P<0.001$ ) legal contexts. In countries with a moderate legal context, there was no decrease in the use of contraceptives soon after abortion (COCHRAN-ARMITAGE TEST:  $Z=-1.59$ ;  $P=0.11$ ).

**Figure 4.** Use of contraception soon after abortion



Source: CLAP MUSA-Network.

## Discussion

Comprehensive abortion care includes adequate evidence-based management in cases of induced abortions and spontaneous pregnancy losses, as well as counseling and adequate provision of contraceptive methods (11). Analyzing many cases of women in abortion situations in our regional database, we observed that the COVID-19 pandemic had no significant influence on the quality of comprehensive abortion care provided in the sentinel centers of the CLAP MUSA-Network. We did not notice a significant reduction in the number of cases attended, in the number of legal interruptions, and we did not observe a significant increase in the number of complications, both in cases of legal interruption and in cases of post-abortion care. In addition, the possible influence of the pandemic on the use of contraceptive methods soon after abortion was small.

The COVID-19 pandemic was declared in early 2020 and brought a series of changes to the lives of diverse populations around the world. (1,2). In addition to the imminent risk of morbidity and mortality related to the coronavirus infection, the indirect consequences were many. At the current stage, when we are approaching the end of this global health crisis, it is important to know its secondary effects. Some recent reviews of the literature have found discrepant results depending on the location and context in which women are assisted (14,15). With many cases included over 5 years, we

aggregated data to help understand the effects that changes in the external and internal context of health institutions can have on comprehensive post-abortion care.

Maintaining women's access to legal termination of pregnancy was one of the major concerns in the first months of the pandemic (16). In early 2020, different international societies published statements stating that access to abortion should be properly maintained (17). There was a fear that the prioritization of resources for the treatment of complications of COVID-19, associated with the home isolation recommended in several countries, would negatively influence the availability of services that perform legal termination of pregnancy, especially in low- and middle-income countries (14). Some studies identified a decrease in available resources (18-20) and changes in health protocols (21) that affected the care provided to the population. As a result, several studies using data from countries located on different continents have reported a decrease in the number of safe abortion services (14,22,23,24). The legal context could also influence comprehensive abortion care. A FIGO survey of key informants in 29 countries reported that 69% of countries with a moderate legal context made some kind of flow change to facilitate access to abortion during the pandemic. According to this same survey, no country with a restrictive legal context has taken a similar attitude (25). Our data suggest that the pandemic had no negative influence on access to legal termination of pregnancy in the sentinel centers of the CLAP MUSA-Network. We did not observe a decrease in the number of cases, regardless of the legal context of the country (liberal or moderate). Furthermore, we did not observe a decrease in the proportion of legal interruptions. We were concerned that the barriers imposed by the pandemic could increase the number of cases of postabortion care at the expense of cases of legal termination, especially in countries with a moderate legal context. On the contrary, we observe an increase in the proportion of legal interruptions, both in countries with a liberal context and in countries with a moderate context. The sentinel centers of the CLAP MUSA-Network are institutions committed to the provision of high quality sexual and reproductive health services. We believe that the efforts made by the highly motivated professionals at these health units were essential factors in maintaining services to the population during the pandemic.

The influence of the pandemic on sexual and reproductive health can also be assessed by analyzing the frequency of abortion-related complications. A recent review of the literature did not find a systematic pattern of the pandemic's influence on the need for postabortion care in low- and middle-income countries. Possibly this is due to the different contexts analyzed and the quality of the reported data (14). When analyzing the characteristics of the women assisted in the sentinel centers of the CLAP MUSA-Network, we did not verify significant changes in their clinical and sociodemographic profile. In addition, we could observe that there was no significant change in the time of transport to the health unit and in the time of symptomatology that the woman presented until being attended at the hospital. To facilitate the understanding of complications, we chose to analyze separately complications in cases of legal termination of pregnancy from complications in cases of post-abortion care (non-legal termination). It is noteworthy that cases classified as *post-abortion care* include cases of spontaneous pregnancy losses, such as miscarriage, and cases that may be related to deliberate attitudes to induce abortion, often in an unsafe manner. One finding worth mentioning is that the frequency of complications in cases of legal termination of pregnancy (0.28%) was much lower than the frequency of complications in cases of post-abortion care (9%). Furthermore, the majority (70%) of complications during a legal termination of pregnancy were diagnosed intraoperatively. In cases of post-abortion care, most complications (95%) occurred at the time of hospital admission, such

as infection, excessive bleeding or hypovolemic shock. The prevalence of complications observed in post-abortion care cases considering the total period evaluated was higher than previously reported in the literature (26,27). However, it is worth mentioning that many sentinel centers of the CLAP MUSA Network are tertiary level institutions, which receive cases referred from other locations, which may contribute to a higher occurrence of complications. Our data suggest that the COVID-19 pandemic did not negatively influence the number of complications observed in the sentinel centers of the CLAP MUSA Network. On the contrary, both in cases of legal termination of pregnancy and in cases of post-abortion care, we observed a decrease in the frequency of complications. We also used the WHO criteria for defining severe maternal morbidity/Near Miss (SMO). Due to the smaller number of cases that met criteria for SMO, we analyzed cases of legal termination and post-abortion care together. In line with the drop in the frequency of complications, we observed a drop in cases of SMO. The observed decrease was more evident in countries with a moderate legal context, which showed a decrease in complications and SMO, and countries with a liberal legal context, which showed a decrease in the frequency of SMO. Possibly, participation in the CLAP MUSA-Network, which encourages using practice of safe care based on scientific evidence (9) contributed to the improvement in these indicators of quality of care provided. As for countries with a restrictive legal context, we did not observe a decrease in the number of complications and SMO. However, we emphasize that the relative frequency of complications and SMO reported by sentinel centers in a restrictive context was already relatively low since the beginning of the evaluated period.

To better understand the factors independently associated with complications and SMO, and to analyze the effects of the COVID-19 pandemic through another statistical approach, we built multiple logistic regression models. We found no association between the pandemic period and a greater chance of complications and SMO. However, we found other associations that need to be discussed. Women assisted in sentinel centers located in countries with a moderate legal context were more likely to have complications both in the legal termination of pregnancy and in post-abortion care. This finding is in line with previously published studies, which indicate that women residing in countries that impose restrictions on abortion have a higher incidence of complications (15,28). We believe that the finding of greater chance of complications in post-abortion care in countries with a liberal context when compared to countries with a restrictive context is due to the very low number of complications reported by countries with a restrictive context during the entire period. We emphasize that the association was very small and may be related to the adjustment in data collection at the beginning of the establishment of the CLAP MUSA-Network.

When necessary, uterine evacuation can be performed using instruments such as curettage and intrauterine manual vacuum aspiration, or exclusively with the use of medication. We observed that during the pandemic period a greater proportion of women underwent uterine evacuation with medication alone. In contrast, a smaller proportion of women underwent manual intrauterine vacuum aspiration. Possibly, the fact that abortion with medication only requires less time in health units (considering those where medication is not exclusively used in hospitals) may have had a positive influence on its use. The fear of greater exposure to the coronavirus during in-hospitals intrauterine vacuum aspiration within a health unit may have influenced the decrease in its use. Similar findings have been reported, as services that require a shorter patient stay at the health unit, as in the case of telemedicine and drug delivery by mail, increased during the pandemic (24). We highlight the finding of lower chance of complications in women submitted to exclusive medical uterine evacuation, both

in post-abortion care and in the legal interruption of pregnancy. The CLAP MUSA-Network encourages the adoption of safe practices for legal termination of pregnancy and management of post-abortion complications. In cases where uterine evacuation is necessary, the exclusive use of medication is a safe and effective method (11, 29-31), and is an evidence-based option, especially in replacing curettage, which carries a greater risk of acute complications, such as uterine perforation and bleeding (32), and late ones, such as the formation of synechiae (33). In our study, we observed a greater chance of complications in post-abortion care and SMO in women undergoing uterine curettage.

In our study, we observed that the greater the gestational age, the greater the chance of complications in cases of legal termination and post-abortion care, in addition to the greater chance of having SMO. The clinical characteristics inherent to a more advanced pregnancy, such as a larger uterine volume and a greater amount of ovular remains, may increase the possibility of uterine atony, perforation and sepsis (34,35). Some aspects related to an unintended pregnancy were associated with a greater chance of having SMO and complications in post-abortion care. Women with a higher number of previous births and who live alone possibly did not want the pregnancy, which may have led to taking deliberate measures to induce an abortion, possibly in an unsafe manner. This association was clear when we observed that the chance of presenting serious complications (SMO) was 128% higher in cases of post-abortion care when compared to legal termination of pregnancy. The association we observed between older women and fewer complications in post-abortion care is in line with previous studies that reported higher pregnancy-related morbidity in younger women, such as adolescents between 10 and 14 years old (36,37). We believe that the association between higher education and a greater chance of complications in post-abortion care may be due to aspects such as stigma, shame, fear of criticism and fear of absenteeism at work, which lead to a delay in seeking the health service, which may lead to a higher occurrence of complications (38).

The occurrence of unintended pregnancies is a global public health problem, however, more pronounced in low-income countries. Between 2015 and 2019, an estimated 121 million unintended pregnancies occurred annually, corresponding to a global rate of 64 unintended pregnancies per 1000 women aged 15-49 years (39). Unintended pregnancy rates are higher in less developed countries, estimated at 93 per 1000 women of reproductive age in low-income countries, compared to 34 per 1000 women of reproductive age in high-income countries (39). Unintended pregnancy is the main reason for terminating pregnancy, both in countries where the law guarantees a woman's right to a safe abortion, and in countries where the legal context does not allow voluntary termination of pregnancy. This increases the possibility that the abortion process will take place in an unsafe manner (39). The initiation of use of contraceptive methods immediately after an abortion is part of comprehensive post-abortion care. Postponing the initiation of contraceptive methods until future medical appointments increases the risk of an unintended pregnancy. Studies show that approximately 85% of women ovulate again before having a new episode of menstrual bleeding after abortion. In addition, more than half of women resume sexual activity within two weeks of having an abortion (40,41). Women who start contraceptives immediately after an abortion have a lower rate of unintended pregnancies and, consequently, of unsafe abortions, however, this is not a well-documented practice in low-income countries (42).

Recent studies show that there was a decrease in access to contraceptive methods due to the pandemic in several countries around the world (14,24). However, we are not aware of studies that have specifically analyzed the influence of the pandemic on the rates of use of contraceptive methods

shortly after abortion in low- and middle-income countries. We observed a 76.34% rate of contraceptive use soon after abortion throughout the analyzed period in the total sample of cases included. However, the difference according to the legal context was notable. While countries with a liberal/moderate legal context had rates between 70-95% during the entire period analyzed, countries with a restrictive context had rates between 30-50%. A recent report by the United Nations Population Fund estimates that 46% of women in the Dominican Republic, one of the countries with a restrictive legal context included in our study, do not have access to contraceptive methods. In this same country, the fertility rate among adolescents is 94.3 live births per 1000 women aged 15-19 years and the maternal mortality rate is 107 per 100,000 live births, surpassing the general rates in Latin America (43).

When analyzing the trend over the years evaluated, we observed a decrease in the initiation of contraceptives immediately after an abortion in the total sample of women evaluated, however, this decrease may have been influenced by the significant reduction between 2017 and 2018 in countries with a restrictive legal context. Apparently, the COVID-19 pandemic had different influences depending on the legal context. In countries with a liberal context, the rates that were 83% in 2019 decreased to 70% in 2021. In countries with a moderate legal context, the rates that were 93% in 2019 decreased to 80% in 2021. Despite the drop, we emphasize that these rates can still be considered high, since the present study also included women who had spontaneous abortions and who possibly wanted a new pregnancy. Studies on the subject have reported rates of 70 and 92% after interventions aimed at improving post-abortion contraception rates (44,45). In countries with a restrictive legal context, the values were 46% in 2019, with a drop to 24% in 2020, followed by an increase to 47% in 2021. We believe that the possible effect of the pandemic, if any, was small. The fear of acquiring the SARS-COV2 infection as a result of spending more time in health units may have influenced the decision to start a contraceptive method before hospital discharge. Adaptations that occurred after the first year of the pandemic may have helped in the recovery of rates in health units in a restrictive context. The daily action of continuing education of health teams regarding the importance of contraception soon after abortion is fundamental. In a study of 1880 women in Ghana, Kayi et al found that counseling given by health professionals in institutions where patients receive care is strongly associated with the immediate initiation of post-abortion contraception (46). With regular feedback on indicators related to the quality of post-abortion care, the CLAP MUSA-Network has encouraged these good practices in its sentinel centers.

Our study has limitations that need to be discussed. As this is a cross-sectional study, we were unable to establish cause and effect relationships. In cases of post-abortion care, it was not possible to establish the cause of the abortion, that is, we could not differentiate spontaneous abortions from induced abortions, that characterize this scenario. We believe that the finding of greater chance of complications in cases of post-abortion care treated in countries with a liberal context when compared to countries with a restrictive context is due to the very low number of complications reported by countries with a restrictive context during the entire period. As the analyzes were performed based on data used primarily as clinical records as regular method to register each case assisted in health units, failures in filling and lack of specific data for each woman assisted may have occurred. The observed high prevalence of complications in sentinel centers with a legally restricted moderate context, in addition to the decrease in the use of contraceptives in countries with a restrictive context between 2017 and 2018, may be due to adaptations in data collection at the beginning of the follow-up. As we



do not have middle term longitudinal data on the women treated, we are unable to estimate the success rate of uterine evacuation exclusively with medication. However, using a large database with important information on complications and contraceptive use, we were able to assess the influence of the COVID-19 pandemic on women in abortion situations in Latin America and the Caribbean. Our data will be able to help the development of public health policies, not only to face the next pandemic, but also to guarantee women's rights to comprehensive abortion care.

## Conclusion

The large number of cases analyzed over a period of 5 years allows us to conclude that the COVID-19 pandemic was not associated with a decrease in the number of cases, a decrease in the proportion of legal interruptions, or an increase in complications in sentinel centers of the CLAP MUSA-Network. Possibly, the pandemic negatively influenced the use of contraceptive methods started immediately after the abortion. However, the main influence on the use of contraceptives was the legal context where each health facility is located. Efforts are needed to scale up and increase the use of post-abortion contraception in countries with a restrictive legal context in order to reduce the occurrence of unintended pregnancies, unsafe abortions and, therefore, to save lives.

## Conflicts of interest

The authors declare there is no conflicts of interest.

## Author contribution

The authors are responsible for the conceptualization, writing, critical review and approval of final version to be published.

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