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The Intersection of HIV, Social Vulnerability, and Reproductive Health: Analysis of Women Living with HIV in Rio de Janeiro, Brazil from 1996 to 2016

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Abstract

Comprehensive care for sexual and reproductive health (SRH) and social needs for women living with HIV remains limited globally. We aimed to assess trends in baseline sociodemographic, clinical, sexual, and reproductive characteristics among a cohort of HIV-infected women in Rio de Janeiro from 1996 to 2016. Participants were stratified into four time periods based on year of enrollment; we compared cross-sectional data from each period. Of 1361 participants (median age 36), most were black or mixed race (60.1%), unemployed (52.1%), and without secondary education (54%). Adolescent pregnancy was common (51.5%), and 18.3% reported sexual debut at < 15 years old. Nearly half (45.2%) had < 5 lifetime sexual partners, yet prior syphilis and oncogenic human papillomavirus prevalence were 10.9% and 43.1%, respectively. Lifetime prevalence of induced abortion was 30.3%, and 16% used no contraceptive method. Future research should explore interactions between social vulnerability, HIV, and poor SRH outcomes and healthcare models to alleviate these disparities.

Keywords HIV · Sexual and reproductive health · Women · Disparities · Brazil

Resumen

La atención integral de la salud sexual y reproductiva (SSR) y necesidades sociales para las mujeres que viven con VIH ha estado limitada al nivel global. Nuestro objetivo fue evaluar las tendencias de características sociodemográficas, clínicas, sexuales y reproductivas en una cohorte de mujeres infectadas por VIH en Río de Janeiro entre 1996 y 2016. Los participantes se estratificaron en cuatro períodos de tiempo según el año de enrolamiento; comparamos datos transversales de cada período. De 1361 participantes (mediana de edad 36), la mayoría eran negras o de raza mixta (60,1%), desempleadas (52,1%) y no tenían educación secundaria (54%). El embarazo en la adolescencia fue común (51,5%) y el 18,3% reportaron iniciación sexual antes de los 15 años de edad. Casi la mitad (45,2%) tenían menos de 5 parejas sexuales durante sus vidas, sin embargo, la prevalencia de la sífilis previa y del virus del papiloma humano oncogénico fue del 10,9% y 43,1%, respectivamente. La prevalencia de vida de aborto inducido fue 30,3% y el 16% no utilizaron ningún método anticonceptivo. Futuras investigaciones deberían explorar las interacciones entre la vulnerabilidad social, el VIH y los resultados adversos de SSR y los modelos de cuidado de la salud para aliviar estas disparidades.

Palabras clave VIH · Salud sexual y reproductiva · Mujeres · Disparidades · Brasil

Introduction

In 2016, more than half of the 34.5 million adults living with HIV worldwide were women [1]. Brazil's epidemic has reflected global epidemiology, with dramatic increases in HIV/AIDS cases among women from the mid-1990s to early-2000s [2, 3]. In 2015, women accounted for

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approximately 35% of AIDS cases in Brazil [2]. Although the past two decades have seen incredible gains in HIV outcomes, healthcare models have not adequately integrated the myriad of social, sexual and reproductive health needs of women living with HIV [4–6]. Therefore, international organizations have recently called for a "woman-centered" approach to HIV care that comprehensively incorporates social determinants and reproductive services [4, 7].

The improved life expectancy and overall health that accompanies HIV treatment advances has important implications for sexual and reproductive health (SRH). Reproductive desires for HIV-infected individuals are similar to HIV-uninfected peers [8, 9] and, as maternal-to-child HIV transmission has been greatly reduced, women living with HIV are increasingly choosing to have children [10]. Yet, accommodating these changing attitudes can be challenging for health services. Women living with HIV report negative interactions with providers regarding provision of options for healthy pregnancy and contraception, as well as unaddressed mental health and social issues [11]. Compared to Brazilian men living with HIV, women experience lower HIV treatment adherence and quality of life [12, 13].

Interactions between biological, behavioral, cultural, and structural factors contribute to women's vulnerability to HIV infection. As such, women living with HIV may have complex psychosocial needs arising from both their social circumstances and stigmatization related to HIV disease. Gender-based violence reduces engagement for women living with HIV at multiple levels of the care continuum [14], and may be a particularly salient issue for the Latin American region, where high rates of intimate partner violence, sexual assaults, and femicide have been documented [15, 16]. Women experience disproportionate financial barriers to accessing HIV care that can be exacerbated by gendered norms such as childcare responsibilities, financial dependence, and restricted personal autonomy [17]. Furthermore, women worldwide report social stigma as a major obstacle to accessing HIV services, which may be related to oppressive views of female sexuality that can limit HIV disclosure and care-seeking behaviors [17, 18].

Women living with HIV experience high rates of interpersonal violence, substance use, and mental illness that may contribute to greater vulnerability and adverse health outcomes [19, 20]. Globally, living with HIV has been associated with persistent SRH disparities in quality of contraceptive methods, unintended pregnancy, and induced abortion [21–23]. Brazilian literature presents similar findings: HIV-infected women had earlier sexual initiation, more illicit substance use, higher rates of sexually transmitted infections (STIs), and were more often victims of sexual violence compared to HIV-uninfected women [24]. Other Brazilian studies have found disparities in reproductive outcomes like unplanned pregnancy and abortion [6], and highlighted social vulnerabilities of young HIV-infected women [25]. While these studies characterize women living with HIV during specific time periods, there is limited information on the evolution of sociodemographic characteristics and SRH outcomes in Brazil.

To better implement international recommendations for woman-centered HIV services, it is important to understand how these characteristics have changed over the years and describe the current needs of women living with HIV. We analyzed data from the Instituto Nacional de Infectologia Evandro Chagas, Fundação Oswaldo Cruz (INI-Fiocruz) women's cohort in Rio de Janeiro, Brazil. Our objectives were to describe sociodemographic, clinical, sexual, and reproductive characteristics of the INI-Fiocruz cohort and to assess trends in these baseline characteristics from 1996 to 2016. These findings can be used to improve understanding of social needs and SRH disparities among women living with HIV, and to suggest possible directions for optimizing HIV care and service delivery for this population. Analyzing trends over time also allows us to describe changes in the characteristics of interest and to hypothesize about the potential effects of Brazilian policies and programs designed to advance HIV treatment and promote women's health.

Methods

Study Population and Procedures

The INI-Fiocruz women's cohort was established in 1996 as an open cohort of HIV-infected women. The observational cohort is clinic-based, and serves women from the city of Rio de Janeiro and surrounding metropolitan areas. Women with documented HIV infection were invited to enroll, and informed consent was obtained from all individual participants. Participants were excluded from this analysis if they were: < 18 years old, not enrolled in the HIV clinical cohort at INI-Fiocruz, or had incomplete baseline questionnaires. Study visits occurred every 6–12 months, and consisted of structured interviews, clinical and laboratory assessments, and gynecologic exam with specimen collection and cervical cytology. Face-to-face interviews collected information on socioeconomic characteristics, substance use, sexual and reproductive history, and HIV disease history.

Study Definitions

Cohort enrollment was defined as the first study visit date. Self-reported race/skin color was categorized as: white,

black, mixed, or other. For cases of unknown HIV exposure route, women without identifiable risk factors of injection drug use (IDU), transfusion, or vertical transmission were assumed to be exposed through sexual contact. Baseline $CD4^+$ T lymphocyte count and HIV-1 RNA were defined as the value recorded closest to enrollment date, within a window of 180 days before or after enrollment. Use of antiretroviral therapy (ART) at cohort entry was defined as the regimen initiated before the enrollment date with an end date occurring after enrollment. Combination antiretroviral therapy (cART) use was defined as any exposure to at least one ART backbone drug (nucleoside reverse transcriptase inhibitor [NRTI]) and at least one ART core drug class (non-NRTI, protease inhibitor, or integrase strand transfer inhibitor).

STI co-infections were classified as prevalent if diagnosed any time before enrollment and up to 30 days after enrollment. Prior syphilis was diagnosed by positive treponemal antibody test (FT-ABS or TPHA). Human papillomavirus (HPV) was assessed using hybrid capture II technique (Digene Inc.). Oncogenic strains included HPV types 16, 18, 31, 33, 35, 39, 45, 51, 52, 56, 58, 59, and 68. As routine HPV sample processing ceased in 2013, women enrolling in 2013 or later were censored for this variable. Gonorrhea and chlamydia infections were only assessed by self-report, and were therefore excluded.

Adolescent pregnancy was defined as pregnancy between 10 and 19 years of age [26]. Contraceptive methods were assessed for pre-menopausal women who were sexually active within the past year, and were based on current method at enrollment. Methods were categorized hierarchically (i.e., if dual methods were used, participants were categorized by the most effective method). Participants were asked about condom use as a method of contraception, in addition to use for STI prevention. Dual methods were defined as use of barrier contraception plus another effective method, including: intrauterine devices (IUDs), oral contraceptive pills (OCPs), injectable contraceptives, and tubal ligation.

Statistical Analysis

Descriptive analyses were performed on baseline data for women entering the cohort from May 1996 to June 2016, according to 5-year inclusion periods (1996–2000, 2001–2005, 2006–2010, 2011–2016). Trends were assessed by enrollment period, using Chi squared test for trend in proportions for categorical variables and Poisson linear regression models for continuous variables. We conducted sub-analyses of selected SRH variables, stratified by age at enrollment and treatment status (ART use vs. no ART). Chi squared tests were used for categorical variables and Kruskal–Wallis tests for continuous variables. R (version 3.3.1) was used for all analyses.

Results

Overall, 1361 women met inclusion criteria (Fig. 1). The median and interquartile range (IQR) age at enrollment was 36.2 (29.6, 43.6) years, and median age increased over time from 34.1 to 37.9 years between the first and last periods (p value 0.004). Most participants were black or mixed race (60.1%), unemployed (52.1%), and had < 9 years of education (54%). Increasing proportions of non-white women were enrolled (p-value 0.002), and educational attainment rose over the study period with significantly more women completing 9–11 years of education (p-value < 0.001) (Table 1).

Nearly half of women (42.3%) were current or former smokers, and smoking declined over the study period (p-value 0.021 for current smokers). Exposure to HIV through IDU was 0.4% (Table 2), and marijuana and inhaled cocaine both had a lifetime prevalence of 11.4%. Lifetime history of sexual or physical violence was 38.5%, with 16% and 31.4% reporting exposure to sexual and physical violence, respectively. Sexual violence significantly decreased over time from 27.8 to 10.8% between first and last periods (p-value < 0.001), while physical violence remained unchanged (26.2% vs. 26.4%, p-value 0.841) (Table 1).

Most women (96.3%) were exposed to HIV through sexual contact, while 3.2% were exposed though blood

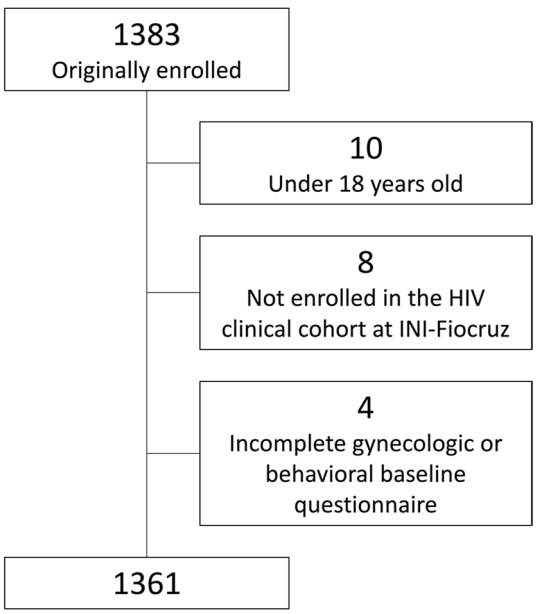

Fig. 1 Enrollment flowchart, INI-Fiocruz women's cohort, 1996–2016

Table 1 Sociodemographic and behavioral characteristics at baseline by study period, INI-Fiocruz women's cohort, 1996–2016

	1996–2000	2001–2005	2006–2010	2011–2016	Total	*p*-value trend	Linear coefficient (95% CI)
Total	302	246	442	371	1361		
Demographics							
Age							
Median (IQR)	34.1 (27.8,41.3)	37.3 (32.1, 43.5)	34.9 (28.8, 43.6)	37.9 (31.1, 45.9)	36.2 (29.6, 43.6)	**0.004**	1.03 (1.01–1.04)[a]
18–24	36 (11.9)	17 (6.9)	51 (11.5)	36 (9.7)	140 (10.3)	0.774	
25–34	126 (41.7)	85 (34.6)	171 (38.7)	108 (29.1)	490 (36)	**0.004**	
35–44	96 (31.8)	97 (39.4)	126 (28.5)	129 (34.8)	448 (32.9)	0.926	
≥ 45	44 (14.6)	47 (19.1)	94 (21.3)	98 (26.4)	283 (20.8)	**< 0.001**	
Skin color							
White	159 (52.6)	116 (47.2)	112 (25.3)	129 (34.8)	516 (37.9)	**< 0.001**	
Black	54 (17.9)	49 (19.9)	102 (23.1)	102 (27.5)	307 (22.6)	**0.002**	
Mixed	89 (29.5)	79 (32.1)	205 (46.4)	138 (37.2)	511 (37.5)	**0.002**	
Other	0 (0)	2 (0.8)	23 (5.2)	2 (0.5)	27 (2)		
Education							
Illiterate	13 (4.3)	5 (2)	10 (2.3)	13 (3.5)	41 (3)	0.613	
Literate and < 4 years	66 (21.9)	57 (23.2)	78 (17.6)	57 (15.4)	258 (19)	**0.010**	
4–8 years	122 (40.4)	61 (24.8)	142 (32.1)	111 (29.9)	436 (32)	**0.035**	
9–11 years	74 (24.5)	92 (37.4)	160 (36.2)	143 (38.5)	469 (34.5)	**< 0.001**	
≥ 12 years	26 (8.6)	23 (9.3)	51 (11.5)	44 (11.9)	144 (10.6)	0.113	
Missing	1 (0.3)	8 (3.3)	1 (0.2)	3 (0.8)	13 (1)		
Employment							
Unemployed	148 (49)	142 (57.7)	230 (52)	189 (50.9)	709 (52.1)	0.946	
Sporadic work	43 (14.2)	31 (12.6)	37 (8.4)	31 (8.4)	142 (10.4)	**0.004**	
Regular work	111 (36.8)	71 (28.9)	150 (33.9)	108 (29.1)	440 (32.3)	0.120	
Missing	0 (0)	2 (0.8)	25 (5.7)	43 (11.6)	70 (5.1)		
Substance use							
Smoking status							
Current smoker	74 (24.5)	58 (23.6)	93 (21)	65 (17.5)	290 (21.3)	**0.021**	
Former smoker	72 (23.8)	59 (24)	92 (20.8)	63 (17)	286 (21)	**0.019**	
Never smoker	155 (51.3)	129 (52.4)	254 (57.5)	241 (65)	779 (57.2)	**< 0.001**	
Missing	1 (0.3)	0 (0)	3 (0.7)	2 (0.5)	6 (0.4)		
Lifetime history of marijuana							
Yes	37 (12.3)	28 (11.4)	46 (10.4)	44 (11.9)	155 (11.4)	0.801	
No	264 (87.4)	218 (88.6)	386 (87.3)	324 (87.3)	1192 (87.6)	0.939	
Missing	1 (0.3)	0 (0)	10 (2.3)	3 (0.8)	14 (1)		
Lifetime history of inhaled cocaine							
Yes	40 (13.2)	31 (12.6)	46 (10.4)	38 (10.2)	155 (11.4)	0.158	
No	261 (86.4)	215 (87.4)	386 (87.3)	330 (88.9)	1192 (87.6)	0.300	
Missing	1 (0.3)	0 (0)	10 (2.3)	3 (0.8)	14 (1)		
History of violence							
Lifetime history of physical violence							
Yes	79 (26.2)	87 (35.4)	163 (36.9)	98 (26.4)	427 (31.4)	0.841	

Table 1 (continued)

	1996–2000	2001–2005	2006–2010	2011–2016	Total	*p*-value trend	Linear coefficient (95% CI)
No	214 (70.9)	151 (61.4)	266 (60.2)	270 (72.8)	901 (66.2)	0.633	
Missing	9 (3)	8 (3.3)	13 (2.9)	3 (0.8)	33 (2.4)		
Lifetime history of sexual abuse							
Yes	84 (27.8)	41 (16.7)	53 (12)	40 (10.8)	218 (16)	**< 0.001**	
No	212 (70.2)	199 (80.9)	385 (87.1)	330 (88.9)	1126 (82.7)	**< 0.001**	
Missing	6 (2)	6 (2.4)	4 (0.9)	1 (0.3)	17 (1.2)		

[a]For this variable overall age was divided by 5; coefficients represent 5-year age increases

Table 2 HIV clinical characteristics at baseline by study period, INI-Fiocruz women's cohort, 1996–2016

	1996–2000	2001–2005	2006–2010	2011–2016	Total	*p*-value trend	Linear coefficient (95% CI)
Total	302	246	442	371	1361		
Route of HIV exposure							
Sexual	284 (94)	240 (97.6)	430 (97.3)	357 (96.2)	1311 (96.3)	0.121	
Injection drug use	4 (1.3)	1 (0.4)	1 (0.2)	0 (0)	6 (0.4)		
Other[a]	14 (4.6)	5 (2)	11 (2.5)	14 (3.8)	44 (3.2)		
$CD4^+$ T lymphocyte count							
Median (IQR)	361 (184, 554)	345 (208, 506)	462 (317, 631)	486 (270, 730)	421 (251, 608)	**< 0.001**	1.13 (1.12–1.15)[b]
< 200	77 (25.5)	52 (21.1)	44 (10)	55 (14.8)	228 (16.8)	**< 0.001**	
200–499	116 (38.4)	113 (45.9)	199 (45)	120 (32.3)	548 (40.3)	0.115	
≥ 500	91 (30.1)	58 (23.6)	190 (43)	166 (44.7)	505 (37.1)	**< 0.001**	
Missing	18 (6)	23 (9.3)	9 (2)	30 (8.1)	80 (5.9)		
HIV-1 RNA (copies/mL)							
< 400	48 (15.9)	116 (47.2)	236 (53.4)	255 (68.7)	655 (48.1)	**< 0.001**	
≥ 400	158 (52.3)	104 (42.3)	184 (41.6)	84 (22.6)	530 (38.9)	**< 0.001**	
Missing	96 (31.8)	26 (10.6)	22 (5)	32 (8.6)	176 (12.9)		
ART use							
No ART	111 (36.8)	103 (41.9)	228 (51.6)	114 (30.7)	556 (40.9)	0.465	
ART but not cART	121 (40.1)	6 (2.4)	2 (0.5)	0 (0)	129 (9.5)		
cART	70 (23.2)	137 (55.7)	212 (48)	257 (69.3)	676 (49.7)	**< 0.001**	

[a]Other exposures include: blood transfusion and maternal-to-child transmission

[b]For this variable $CD4^+$ T lymphocyte count was divided by 50; coefficients represent 50 count changes

transfusion or vertical transmission. The proportion of women on cART at enrollment increased from 23.2 to 69.3% between the first and last periods (p-value < 0.001) (Table 2). This increase in use of treatment is reflected in the median $CD4^+$ T lymphocyte count and the proportion of participants with HIV-1 RNA < 400 copies/mL at enrollment, both of which also increased significantly over time (p-value < 0.001 for both). Median (IQR) time between HIV diagnosis and cohort entry was 1.5 (0.6, 4.6) years.

Overall, 18.3% initiated sexual activity before the age of 15, and age at sexual debut significantly decreased over time (p-value < 0.001). Median (IQR) age at first pregnancy was 19 (17, 22) years, and 62 women (4.6%) experienced pregnancy before age 15. The prevalence of adolescent pregnancy and birth were 51.5% and 39.2%, respectively, and both increased significantly over time (p-value 0.008, < 0.001).

Most women (75.5%) were sexually active within the past year, and 79.4% reported 10 or fewer lifetime partners. Prior

syphilis and oncogenic HPV infections remained stable with total prevalence at 10.9% and 43.1%, respectively (p-value 0.079, 0.208). Barrier methods were the dominant form of contraception (42.8%), while 16% used no method. Tubal ligation was the primary method for 23.3%, and use was unchanged over the study period (p-value 0.079). Hormonal methods and IUDs were used by 14.6% of women, and this proportion increased over time (p-value 0.009). Use of dual methods was 9% overall, but increased from 6.3 to 14% between the first and last periods (p-value < 0.001) (Table 3).

Gravidity decreased (p-value 0.034), but parity remained relatively stable over time with a median (IQR) of 2 (1, 3) (p-value 0.146). Lifetime history of induced abortion was 30.3% for all women in our sample, and 33.4% among women with a past pregnancy (Table 3). History of spontaneous abortion increased over time (p-value 0.002), but pregnancies ending in either spontaneous or induced abortion decreased significantly (from 55 to 41.2% between first and last periods, p-value < 0.001).

Discussion

Our study used two decades of observation to construct a profile of 1361 women living with HIV in Rio de Janeiro and to describe the baseline demographic, social, sexual, and reproductive characteristics of the women's cohort over time. Overall, INI-Fiocruz women living with HIV are a socially vulnerable population. Participants were frequently exposed to physical and sexual violence, experienced sexual debut and childbearing at an early age, had a high burden of STIs, and reported elevated rates of tobacco and illicit substance use compared to women of unknown HIV-status in Brazil [27, 28]. There was an unmet need for family planning, reflected by the low use of dual contraception and high prevalence of induced abortion. We observed dramatic improvements in HIV disease parameters over time (as increasing proportions of women were on cART and had higher $CD4^+$ T lymphocyte counts and lower HIV-1 RNA levels), likely resulting from Brazil's successful HIV/AIDS policies [29].

The cohort underwent several sociodemographic changes: median age and years of education increased over time, and increasing proportions of black and mixed race women were enrolled. These changes mirror the Brazilian epidemic, as recent trends toward increasing AIDS incidence among women over age 55, non-white race, and higher educational status have been observed [2, 6, 25, 30]. Changes in educational attainment may be reflective of increasing age and/or overall improvements in education for women in Brazil [31]. Despite these educational advances, INI-Fiocruz participants remained socioeconomically disadvantaged as most women were unemployed and without secondary education.

Slightly more women in our cohort reported sexual initiation before age 15 compared to women in the general population (18.4% vs. 15.4%) [32]. This is consistent with results from other women's HIV cohorts in Brazil that demonstrate earlier sexual debut for HIV-infected women than for their HIV-uninfected counterparts [6, 24, 25]. Early sexual debut represents a public health concern as sexual activity at younger ages is more likely to be non-consensual and unprotected [33]. Interventions targeting young women are needed in Brazil, as new AIDS diagnoses increased 12.9% for women aged 15–19 from 2006 to 2015 [2]. Adolescent birth was also common in our cohort (39.2%) and increased significantly over time. Our trends contrast with national data, which show decreasing prevalence from 23.5 to 19.2% between 2000 and 2011 [34]. This disparity could be partially attributed to lower socioeconomic status, which has been associated with teenage pregnancy and elevated fertility rates in Brazil [34, 35], or to cohort effects as median age at cohort enrollment increased over time in our sample.

We observed a large burden of prior syphilis and HPV in our population, underscoring the importance of regular gynecologic care for women living with HIV. Prior syphilis infections were higher in our population (10.9%) compared to a prevalence study among Brazilian postpartum women (1.02%), and were similar to other reports of HIV-infected women in Brazil (9.9%) [36, 37]. Our cohort's oncogenic HPV prevalence (43.1%) was similar to international HIV cohorts using comparable laboratory techniques (49.5–51.8%) [38, 39], but higher than previous studies among Brazilian women of unknown HIV status in the general population (20–24.6%) [40–42]. While sexual risk behavior may partially explain these findings, immunosuppression in HIV infection can also lead to reduced HPV clearance [43]. Women in our cohort generally had fewer lifetime partners compared to the Brazilian general population—15.9% INI-Fiocruz versus 26.3% of Brazilian women reporting > 10 lifetime partners [32]. This finding suggests that other sexual risk behaviors (e.g., inconsistent condom use, early sexual debut) may be important predictors of both HIV and STI risk in this population. In addition, there is evidence to suggest that individual socioeconomic and community-level factors like violent crime and high unemployment may contribute to elevated HIV/STI risk, and should be explored further in our cohort [44–46]. Risk factor identification is especially needed for syphilis in Brazil as incidence among women has been rising, significant morbidity is associated with untreated infection, and there is a paucity of literature specific to women living with HIV [47].

Use of highly-effective contraception at cohort entry was low in our sample (37.9%), as women mainly relied on

Table 3 Sexual and reproductive history at baseline by study period, INI-Fiocruz women's cohort, 1996–2016

	1996–2000	2001–2005	2006–2010	2011–2016	Total	*p*-value trend	Linear coefficient (95% CI)
Total	302	246	442	371	1361		
Age at first sexual intercourse							
Median (IQR)	17 (15, 20)	17 (15, 19)	16 (15, 18)	16 (15, 18)	17 (15, 18)	**< 0.001**	−0.97 (−0.96 to −0.98)
< 15	41 (13.6)	34 (13.8)	89 (20.1)	85 (22.9)	249 (18.3)	**< 0.001**	
15–19	181 (59.9)	154 (62.6)	298 (67.4)	244 (65.8)	877 (64.4)	0.053	
≥ 20	77 (25.5)	54 (22)	47 (10.6)	40 (10.8)	218 (16)	**< 0.001**	
Missing	3 (1)	4 (1.6)	8 (1.8)	2 (0.5)	17 (1.2)		
Age at first pregnancy							
Median (IQR)	20 (17, 23)	19 (17, 21)	18 (17, 21.5)	19 (17, 21)	19 (17, 22)	**0.020**	−0.99 (−0.98 to −1.00)
< 20	136 (45)	120 (48.8)	247 (55.9)	198 (53.4)	701 (51.5)	**0.008**	
≥ 20	142 (47)	94 (38.2)	152 (34.4)	124 (33.4)	512 (37.6)	**< 0.001**	
Never pregnant	18 (6)	25 (10.2)	35 (7.9)	47 (12.7)	125 (9.2)	**0.010**	
Missing	6 (2)	7 (2.8)	8 (1.8)	2 (0.5)	23 (1.7)		
Age at first birth							
Median (IQR)	21 (18, 24)	20 (18, 23)	19 (17, 23)	19 (17, 23)	20 (17, 23)	**0.001**	−0.98 (−0.97 to −0.99)
< 20	101 (33.4)	79 (32.1)	193 (43.7)	161 (43.4)	534 (39.2)	**< 0.001**	
≥ 20	156 (51.7)	120 (48.8)	172 (38.9)	144 (38.8)	592 (43.5)	**< 0.001**	
Never pregnant or gave birth	40 (13.2)	39 (15.9)	70 (15.8)	64 (17.3)	213 (15.7)	0.172	
Missing	5 (1.7)	8 (3.3)	7 (1.6)	2 (0.5)	22 (1.6)		
Sexual partners in the past year							
0	64 (21.2)	68 (27.6)	78 (17.6)	92 (24.8)	302 (22.2)	0.875	
1	205 (67.9)	143 (58.1)	313 (70.8)	235 (63.3)	896 (65.8)	0.935	
≥ 2	31 (10.3)	24 (9.8)	40 (9)	37 (10)	132 (9.7)	0.843	
Missing	2 (0.7)	11 (4.5)	11 (2.5)	7 (1.9)	31 (2.3)		
Lifetime partners							
1	33 (10.9)	27 (11)	22 (5)	28 (7.5)	110 (8.1)	**0.018**	
2–4	136 (45)	96 (39)	153 (34.6)	120 (32.3)	505 (37.1)	**< 0.001**	
5–10	83 (27.5)	77 (31.3)	153 (34.6)	152 (41)	465 (34.2)	**< 0.001**	
≥ 11	47 (15.6)	39 (15.9)	75 (17)	55 (14.8)	216 (15.9)	0.908	
Missing	3 (1)	7 (2.8)	39 (8.8)	16 (4.3)	65 (4.8)		
Prior syphilis							
Yes	20 (6.6)	35 (14.2)	48 (10.9)	45 (12.1)	148 (10.9)	0.079	
No	244 (80.8)	205 (83.3)	385 (87.1)	289 (77.9)	1123 (82.5)	0.633	
Missing	38 (12.6)	6 (2.4)	9 (2)	37 (10)	90 (6.6)		
Prevalent oncogenic HPV[a]							
Yes	144 (47.7)	100 (40.7)	183 (41.4)	61 (43)	488 (43.1)	0.208	
No	156 (51.7)	137 (55.7)	237 (53.6)	71 (50)	601 (53.1)	0.935	
Missing	2 (0.7)	9 (3.7)	22 (5)	10 (7)	43 (3.8)		
Contraceptive method[b]							
Tubal ligation	51 (24.9)	51 (31.5)	65 (19.9)	53 (21.2)	220 (23.3)	0.079	
Hormonal and IUD	27 (13.2)	9 (5.6)	55 (16.9)	47 (18.8)	138 (14.6)	**0.009**	
Barrier	91 (44.4)	67 (41.4)	142 (43.6)	104 (41.6)	404 (42.8)	0.671	
Other less effective method	5 (2.4)	1 (0.6)	2 (0.6)	2 (0.8)	10 (1.1)		
No method	29 (14.1)	33 (20.4)	46 (14.1)	43 (17.2)	151 (16)	0.772	
Missing	2 (1)	1 (0.6)	16 (4.9)	1 (0.4)	20 (2.1)		
Dual contraceptive use[b]							
Yes	13 (6.3)	5 (3.1)	32 (9.8)	35 (14)	85 (9)	**< 0.001**[c]	
No	190 (92.7)	156 (96.3)	278 (85.3)	214 (85.6)	838 (88.9)		
Missing	2 (1)	1 (0.6)	16 (4.9)	1 (0.4)	20 (2.1)		
Gravidity							

Table 3 (continued)

	1996–2000	2001–2005	2006–2010	2011–2016	Total	*p*-value trend	Linear coefficient (95% CI)
Median (IQR)	3 (2, 4)	3 (2, 4)	2 (1, 4)	2 (1, 4)	3 (1, 4)	**0.034**	−0.97 (−0.94 to −1.00)
0	18 (6)	25 (10.2)	35 (7.9)	47 (12.7)	125 (9.2)	**0.010**	
1–2	124 (41.1)	89 (36.2)	189 (42.8)	139 (37.5)	541 (39.8)	0.728	
≥ 3	160 (53)	132 (53.7)	218 (49.3)	185 (49.9)	695 (51.1)	0.290	
Parity							
Median (IQR)	2 (1, 3)	2 (1, 3)	2 (1, 3)	2 (1, 3)	2 (1, 3)	0.146	1.03 (0.99–1.06)
0	40 (13.2)	39 (15.9)	70 (15.8)	64 (17.3)	213 (15.7)	0.172	
1–2	177 (58.6)	130 (52.8)	232 (52.5)	181 (48.8)	720 (52.9)	**0.017**	
≥ 3	85 (28.1)	77 (31.3)	140 (31.7)	126 (34)	428 (31.4)	0.111	
Lifetime history of induced abortion							
Yes	125 (41.4)	91 (37)	115 (26)	82 (22.1)	413 (30.3)	**< 0.001**	
No	172 (57)	151 (61.4)	325 (73.5)	286 (77.1)	934 (68.6)	**< 0.001**	
Missing	5 (1.7)	4 (1.6)	2 (0.5)	3 (0.8)	14 (1)		
Lifetime history of spontaneous abortion							
Yes	47 (16.5)	39 (17.6)	112 (27.5)	84 (25.9)	282 (22.8)	**0.002**	
No	232 (81.7)	178 (80.5)	293 (72)	237 (73.1)	940 (76.1)	**< 0.001**	
Missing	5 (1.8)	4 (1.8)	2 (0.5)	3 (0.9)	14 (1.1)		

[a]There were 229 (16.8%) women enrolled in 2013 or later who were excluded from this variable, as HPV results were not routinely collected after this time

[b]There were 302 (22.2%) women who were not sexually active within the past year and 224 (16.5%) post-menopausal women who were excluded from analysis of this variable. There were 3 IUD users total, who were grouped with hormonal contraceptive users. None of the women in our sample used implants. Other less effective methods included spermicide, withdrawal, and rhythm methods

[c]Fisher's exact test

condoms or used no method. A national survey of reproductive-aged, married women in Brazil found that 53.3% used highly-effective methods (27.4% OCPs, 25.9% female sterilization) [48]. While use of hormonal and dual methods in our cohort improved over time, dual use remained well below what is reported nationally (9% vs. 27%) [49]. These findings are consistent with U.S. studies reporting disparities in contraceptive quality for HIV-infected women [21]. Given the reality that women may experience difficulties with condom negotiation and consistent use, the World Health Organization recommends that women living with HIV be counseled on the full range of contraceptive options [4]. Potential barriers to uptake of effective methods (such as cost, limited access, medication non-adherence, or cultural norms) should be explored to help women living with HIV achieve their desired family size. Integration of family planning with HIV care provides a model to increase accessibility and potentially improve reproductive health outcomes [4, 50].

In the INI-Fiocruz women's cohort the prevalence of lifetime induced abortion was 30.3%, compared to 13–15% reported in Brazilian national surveys of urban women aged 18–39 and 17.5% for HIV-infected women in Brazil [51, 52]. Induced abortion is illegal in Brazil (except in cases of rape, danger to the woman's life, or fetal anencephaly) and is often performed under unsafe conditions [23, 53]. Given this reality, substantial underreporting or misreporting of induced abortions as spontaneous is likely. Previous literature indicates that the decision to terminate pregnancy can be influenced by both HIV diagnosis and life circumstances such as age, prior births, and partner stability [10, 23, 54]. The same contexts of vulnerability (e.g., social instability, marginalization) may place women at risk for both HIV infection and abortion [23]. As such, socioeconomic disparities may partially explain our cohort's elevated prevalence. Induced abortion prevalence decreased over time in our population, which could be a consequence of decreasing sexual violence, improved HIV control, or educational advancement among INI-Fiocruz women, as educational status has been correlated with contraceptive knowledge and fewer unplanned pregnancies [55].

While substantial SRH disparities were still present in later cohort years, we observed significant improvements in use of dual contraceptive methods, lifetime abortion prevalence, and sexual violence over time. In 2004, the Brazilian government established a national Comprehensive Women's Health Policy to promote sexual and psychosocial women's health [56]. Expanded contraceptive access, particularly

among women of lower socioeconomic status, resulting from the policy likely contributed to the SRH improvements we observed. Reductions in the cohort's prevalence of sexual violence could be attributed, in part, to the policy's provisions and to 2006 legislation combating gender-based violence. Analysis of nationally-representative household survey data showed reductions in intimate partner violence following the law's implementation [57]. Yet, prevalence of physical violence in our cohort did not diminish and sexual abuse remains unacceptably high, particularly compared to HIV-uninfected women of similar social circumstance in Brazil [6, 24]. As violence can impact psychological health and limit health-promoting behaviors, linking to supportive services is an important component of comprehensive care for women living with HIV [4].

Our study has several limitations. The INI-Fiocruz women's cohort uses open enrollment procedures, and our study population may lack generalizability to other HIV-infected populations because of non-probabilistic sampling. Our use of face-to-face interviews for data collection may have introduced social desirability bias, leading to underreporting of potentially stigmatizing activities like substance use and induced abortion. Women also received treatment through the HIV clinical cohort at Fiocruz prior to women's cohort enrollment, which potentially biases baseline HIV clinical values. We performed stratified analysis of key SRH variables (prior syphilis, parity, lifetime abortion, contraception) by treatment status and did not find significant differences. Age at cohort enrollment increased over time, potentially reflecting different reproductive life stages of study participants. Therefore, we would expect variables measuring cumulative incidence to increase over time (e.g., prior syphilis, parity, lifetime abortion). We conducted sub-analyses of reproductive variables and found no significant differences in time trends with age stratification. We had limited information on whether prior events occurred before or after HIV diagnosis because women were enrolled an average of 1.5 years after HIV diagnosis. These limitations did not impact our overall objective to describe baseline characteristics of women living with HIV to better anticipate their social and SRH needs.

Conclusions

Our analysis revealed a population of highly vulnerable women, with complex social and SRH histories at cohort entry. Integrating services like domestic violence support, specialized gynecologic care, and family planning into routine HIV care could reduce barriers to access and more fully address the spectrum of health needs for women living with HIV. While certain indicators improved over time, much work remains to address the root causes of social vulnerability that place women at risk for HIV infection and SRH disparities. Future research should explore the syndemic interactions between social vulnerability, HIV disease, and poor SRH outcomes that we described, and develop strategies for advancing social progress to improve overall health for women living with HIV.

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Compliance with Ethical Standards

Conflict of interest The authors have no conflicts of interest to declare.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

References

1. UNAIDS Data 2017 [Internet]. Joint United Nations Programme on HIV/AIDS (UNAIDS); 2017 [cited 2018 Apr 21]. http://www.unaids.org/sites/default/files/media_asset/20170720_Data_book_2017_en.pdf.
2. Boletim epidemiológico de AIDS e DST [Internet]. Brasília (BR): Ministério da Saúde. Secretaria de Vigilância em Saúde—Departamento de DST, Aids e Hepatites Virais; 2016 [cited 2018 Apr 20]. http://www.aids.gov.br/ptbr/pub/2016/boletim-epidemiologico-de-aids-2016.
3. Fonseca MG, Bastos FI. Twenty-five years of the AIDS epidemic in Brazil: principal epidemiological findings, 1980–2005. Cad Saude Publ. 2007;23(Suppl 3):S333–44.
4. Consolidated guideline on sexual and reproductive health and rights of women living with HIV [Internet]. Geneva (CH): World Health Organization; 2017 [cited 2018 Apr 21]. http://www.who.int/reproductivehealth/publications/gender_rights/srhr-women-hiv/en/.
5. Loutfy MR, Sherr L, Sonnenberg-Schwan U, et al. Caring for women living with HIV: gaps in the evidence. J Int AIDS Soc. 2013;16:18509.
6. Pinho AA, Cabral CDS, Barbosa RM. Differences and similarities in women living and not living with HIV: contributions by the

GENIH study to sexual and reproductive healthcare. Cad Saude Publ. 2017;33(12):e00057916.
7. Bekker LG, Alleyne G, Baral S, et al. Advancing global health and strengthening the HIV response in the era of the sustainable development goals: the International AIDS Society-Lancet Commission. Lancet. 2018;392(10144):312–58.
8. Fiore S, Heard I, Thorne C, et al. Reproductive experience of HIV-infected women living in Europe. Hum Reprod. 2008;23(9):2140–4.
9. Heffron R, Thomson K, Celum C, et al. Fertility intentions, pregnancy, and use of PrEP and ART for safer conception among East African HIV serodiscordant couples. AIDS Behav. 2018;22(6):1758–65.
10. Haddad LB, Wall KM, Mehta CC, et al. Trends of and factors associated with live-birth and abortion rates among HIV-positive and HIV-negative women. Am J Obstet Gynecol. 2017;216(1):71.e1–16.
11. Orza L, Welbourn A, Bewley S, Crone ET, Vazquez M. Building a safe house on firm ground: key findings from a global values and preferences survey regarding the sexual and reproductive health and human rights of women living with HIV [Internet]. Geneva (CH): Salamander Trust; 2014 [cited 2018 Apr 20]. http://salamandertrust.net/wp-content/uploads/2016/09/BuildingASafeHouseOnFirmGroundFINALreport190115.pdf.
12. de Fatima Bonolo P, Ceccato M, Rocha GM, de Assis Acurcio F, Campos LN, Guimarães MD. Gender differences in non-adherence among Brazilian patients initiating antiretroviral therapy. Clinics. 2013;68(5):612–20.
13. Hipolito RL, Oliveira DC, Costa TLD, Marques SC, Pereira ER, Gomes AMT. Quality of life of people living with HIV/AIDS: temporal, socio-demographic and perceived health relationship. Rev Lat Am Enferm. 2017;25:e2874.
14. Prevention gap report [Internet]. Joint United Nations programme on HIV/AIDS (UNAIDS); 2016 [cited 2018 Nov 24]. http://www.unaids.org/sites/default/files/media_asset/2016-prevention-gap-report_en.pdf.
15. Stewart DE, Aviles R, Guedes A, Riazantseva E, MacMillan H. Latin American and Caribbean countries' baseline clinical and policy guidelines for responding to intimate partner violence and sexual violence against women. BMC Public Health. 2015;15:665.
16. Molinatti F, Acosta LD. Trends in mortality by assault in women in selected countries of Latin America, 2001–2011. Rev Panam Salud Publ. 2015;37(4–5):279–86.
17. Meyer JP, Womack JA, Gibson B. Beyond the pap smear: gender-responsive HIV care for women. Yale J Biol Med. 2016;89(2):193–203.
18. Johnson M, Samarina A, Xi H, et al. Barriers to access to care reported by women living with HIV across 27 countries. AIDS Care. 2015;27(10):1220–30.
19. Meyer JP, Springer SA, Altice FL. Substance abuse, violence, and HIV in women: a literature review of the syndemic. J Womens Health. 2011;20(7):991–1006.
20. Kapetanovic S, Dass-Brailsford P, Nora D, Talisman N. Mental health of HIV-seropositive women during pregnancy and postpartum period: a comprehensive literature review. AIDS Behav. 2014;18(6):1152–73.
21. Sun M, Peipert JF, Zhao Q, et al. Trends in contraceptive use among women with human immunodeficiency virus. Obstet Gynecol. 2012;120(4):783–90.
22. Iyun V, Brittain K, Phillips TK, et al. Prevalence and determinants of unplanned pregnancy in HIV-positive and HIV-negative pregnant women in Cape Town, South Africa: a cross-sectional study. BMJ Open. 2018;8(4):e019979.
23. Pilecco FB, Teixeira LB, Vigo A, Dewey ME, Knauth DR. Lifetime induced abortion: a comparison between women living and not living with HIV. PLoS ONE. 2014;9(4):e95570.
24. Santos NJ, Barbosa RM, Pinho AA, Villela WV, Aidar T, Filipe EM. Contexts of HIV vulnerability among Brazilian women. Cad Saude Publ. 2009;25(Suppl 2):S321–33.
25. Teixeira LB, Pilecco FB, Vigo A, Knauth DR. Sexual and reproductive health of women living with HIV in Southern Brazil. Cad Saude Publ. 2013;29(3):609–20.
26. Adolescent pregnancy: issues in adolescent health and development [Internet]. Geneva (CH): World Health Organization; 2004 [cited 2018 Apr 20]. http://apps.who.int/iris/bitstream/handle/10665/42903/9241591455_eng.pdf;jsessionid=8857E245337E0607B1B6F170D2C1227E?sequence=1.
27. Vigitel Brasil 2016: vigilância de fatores de risco e proteção para doenças crônicas por inquérito telefônico: estimativas sobre frequência e distribuição sociodemográfica de fatores de risco e proteção para doenças crônicas nas capitais dos 26 estados brasileiros e no Distrito Federal em 2016 [Internet]. Brasília (BR): Ministério da Saúde. Secretaria de Vigilância em Saúde—Departamento de Vigilância de Doenças e Agravos não Transmissíveis e Promoção da Saúde; 2017 [cited 2018 May 9]. http://portalarquivos2.saude.gov.br/images/pdf/2018/marco/02/vigitel-brasil-2016.pdf.
28. II Levantamento domiciliar sobre o uso de drogas psicotrópicas no Brasil: Estudo envolvendo as 108 maiores cidades do país: 2005 [Internet]. São Paulo (BR): Secretaria Nacional Antidrogas, Gabinete de Segurança Institucional; 2006 [cited 2018 Apr 23]. https://www.cebrid.com.br/ii-levantamento-domiciliar-2005/. Joint publication of Centro Brasileiro de Informação sobre Drogas Psicotrópicas and Universidade Federal de São Paulo.
29. Okie S. Fighting HIV–lessons from Brazil. N Engl J Med. 2006;354(19):1977–81.
30. Boletim epidemiológico DST/AIDS [Internet]. Secretaria Municipal de Saúde, Prefeitura do Rio de Janeiro. Subsecretaria de Atenção Primária, Vigilância e Promoção da Saúde. Gerência de DST/AIDS e Hepatites Virais; 2013 [cited 2018 Apr 23]. http://www.rio.rj.gov.br/dlstatic/10112/4502878/4114721/anexo1_boletim.indd.pdf.
31. Mujica OJ, Vazquez E, Duarte EC, Cortez-Escalante JJ, Molina J, da Silva Junior JB. Socioeconomic inequalities and mortality trends in BRICS, 1990–2010. Bull World Health Organ. 2014;92(6):405–12.
32. Pesquisa de conhecimentos, atitudes e práticas na população brasileira—PCAP 2013 [Internet]. Brasília (BR): Ministério da Saúde. Secretaria de Vigilância em Saúde—Departamento de DST, Aids e Hepatites Virais; 2016 [cited 2018 Apr 23]. http://www.aids.gov.br/pt-br/pub/2016/pesquisa-de-conhecimentos-atitudes-epraticas-na-populacao-brasileira-pcap-2013.
33. Wellings K, Collumbien M, Slaymaker E, et al. Sexual behaviour in context: a global perspective. Lancet. 2006;368(9548):1706–28.
34. Vaz RF, Monteiro DL, Rodrigues NC. Trends of teenage pregnancy in Brazil, 2000–2011. Rev Assoc Med Bras. 2016;62(4):330–5.
35. Tejada CA, Triaca LM, da Costa FK, Hellwig F. The sociodemographic, behavioral, reproductive, and health factors associated with fertility in Brazil. PLoS ONE. 2017;12(2):e0171888.
36. Domingues RM, Szwarcwald CL, Souza Junior PR, Leal MC. Prevalence of syphilis in pregnancy and prenatal syphilis testing in Brazil: birth in Brazil study. Rev Saude Publ. 2014;48(5):766–74.
37. Adolf R, Bercht F, Aronis ML, Lunardi LW, Schechter M, Sprinz E. Prevalence and risk factors associated with syphilis in a cohort of HIV positive individuals in Brazil. AIDS Care. 2012;24(2):252–8.
38. Ngou J, Gilham C, Omar T, et al. Comparison of analytical and clinical performances of the digene HC2 HPV DNA assay and the INNO-LiPA HPV genotyping assay for detecting high-risk HPV infection and cervical neoplasia among HIV-positive African women. J Acquir Immune Defic Syndr. 2015;68(2):162–8.

39. Heard I, Cubie HA, Mesher D, Sasieni P. Characteristics of HPV infection over time in European women who are HIV-1 positive. BJOG. 2013;120(1):41–9.
40. Lippman SA, Sucupira MC, Jones HE, et al. Prevalence, distribution and correlates of endocervical human papillomavirus types in Brazilian women. Int J STD AIDS. 2010;21(2):105–9.
41. Coser J, da Rocha Boeira T, Simon D, Kazantzi Fonseca AS, Ikuta N, Lunge VR. Prevalence and genotypic diversity of cervical human papillomavirus infection among women from an urban center in Brazil. Genet Mol Res. 2013;12(4):4276–85.
42. Tamegao-Lopes BP, Sousa-Junior EC, Passetti F, Ferreira CG, de Mello WA, Duarte Silvestre RV. Prevalence of human papillomavirus infection and phylogenetic analysis of HPV-16 E6 variants among infected women from Northern Brazil. Infect Agent Cancer. 2014;9:25.
43. Liu G, Sharma M, Tan N, Barnabas RV. HIV-positive women have higher risk of human papilloma virus infection, precancerous lesions, and cervical cancer. AIDS. 2018;32(6):795–808.
44. Cianelli R, Villegas N. Social determinants of health for HIV among Hispanic women. Hisp Health Care Int. 2016;14(1):4–9.
45. Haley DF, Kramer MR, Adimora AA, et al. Relationships between neighbourhood characteristics and current STI status among HIV-infected and HIV-uninfected women living in the Southern USA: a cross-sectional multilevel analysis. Sex Transm Infect. 2017;93(8):583–9.
46. Howe CJ, Siegel H, Dulin-Keita A. Neighborhood environments and sexual risk behaviors for HIV infection among U.S. women: a systematic review. AIDS Behav. 2017;21(12):3353–65.
47. Boletim epidemiológico de sífilis [Internet]. Ministério da Saúde. Secretaria de Vigilância em Saúde—Departamento de Vigilância, Prevenção e Controle das IST, do HIV/Aids e das Hepatites Virais; 2017 [cited 2018 Apr 20]. http://portalarquivos.saude.gov.br/images/pdf/2017/novembro/13/BE-2017-038-Boletim-Sifilis-11-2017-publicacao-.pdf.
48. Pesquisa Nacional de Demografia e Saúde da Criança e da Mulher—PNDS 2006: dimensões do processo reprodutivo e da saúde da criança [Internet]. Brasília (BR): Ministério da Saúde. Centro Brasileiro de Análise e Planejamento; 2009 [cited 2018 Apr 21]. http://bvsms.saude.gov.br/bvs/publicacoes/pnds_crianca_mulher.pdf.
49. Tsuyuki K, Gipson JD, Urada LA, Barbosa RM, Morisky DE. Dual protection to address the global syndemic of HIV and unintended pregnancy in Brazil. J Fam Plann Reprod Health Care. 2016;42(4):271–9.
50. Cohen CR, Grossman D, Onono M, et al. Integration of family planning services into HIV care clinics: results one year after a cluster randomized controlled trial in Kenya. PLoS ONE. 2017;12(3):e0172992.
51. Diniz D, Medeiros M, Madeiro A. Pesquisa Nacional de Aborto 2016. Cien Saude Colet. 2017;22:653–60.
52. Barbosa RM, Pinho AA, Santos NS, Filipe E, Villela W, Aidar T. Induced abortion in women of reproductive age living with and without HIV/Aids in Brazil. Cien Saude Colet. 2009;14(4):1085–99.
53. Fusco CL, Silva RS, Andreoni S. Unsafe abortion: social determinants and health inequities in a vulnerable population in São Paulo, Brazil. Cad Saude Publ. 2012;28(4):709–19.
54. Maccarthy S, Rasanathan JJ, Crawford-Roberts A, Dourado I, Gruskin S. Contemplating abortion: HIV-positive women's decision to terminate pregnancy. Cult Health Sex. 2014;16(2):190–201.
55. Dehlendorf C, Rodriguez MI, Levy K, Borrero S, Steinauer J. Disparities in family planning. Am J Obstet Gynecol. 2010;202(3):214–20.
56. Diniz SG, Araujo MJ. Commentary: reproductive health and rights in Brazil 20 years post-international conference on population and development. Glob Public Health. 2015;10(2):183–5.
57. Ally EZ, Laranjeira R, Viana MC, et al. Intimate partner violence trends in Brazil: data from two waves of the Brazilian National Alcohol and Drugs Survey. Rev Bras Psiquiatr. 2016;38(2):98–105.

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