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Individual- and contextual-level factors associated with client-initiated HIV testing

Fatores individuais e contextuais associados à realização do teste anti-HIV por busca espontânea

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ABSTRACT: ***Background:*** Knowing the reasons for seeking HIV testing is central for HIV prevention. Despite the availability of free HIV counseling and testing in Brazil, coverage remains lacking. ***Methods:*** Survey of 4,760 respondents from urban areas was analyzed. Individual-level variables included sociodemographic characteristics; sexual and reproductive health; HIV / AIDS treatment knowledge and beliefs; being *personally acquainted with a person with HIV / AIDS;* and holding discriminatory ideas about people living with HIV. Contextual-level variables included the Human Development Index (HDI) of the municipality; prevalence of HIV / AIDS; and availability of local HIV counseling and testing (CT) services. The dependent variable was client-initiated testing. Multilevel Poisson regression models with random intercepts were used to assess associated factors. ***Results:*** Common individual-level variables among men and women included being *personally acquainted with a person with HIV / AIDS* and age; whereas discordant variables included those related to sexual and reproductive health and experiencing sexual violence. Among contextual-level factors, availability of CT services was variable associated with client-initiated testing among women only. The contextual-level variable "HDI of the municipality" was associated with client-initiated testing among women. ***Conclusion:*** Thus, marked gender differences in HIV testing were found, with a lack of HIV testing among married women and heterosexual men, groups that do not spontaneously seek testing.

Keywords: AIDS serodiagnosis HIV testing. Vulnerability. Gender.

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RESUMO: ***Introdução:*** O motivo da busca pelo teste anti-HIV é questão central para a prevenção do HIV. Apesar da realização do teste e aconselhamento ser gratuito no Brasil há lacunas na cobertura do teste. Esse estudo analisou a associação entre os fatores individuais e contextuais e a realização do teste anti-HIV na população brasileira. ***Métodos:*** Inquérito populacional, com 4.760 residentes em áreas urbanas. As variáveis do nível individual foram sociodemográficas; saúde sexual e reprodutiva; conhecimento sobre HIV/AIDS; conhecer pessoas com HIV/AIDS; ideias discriminatórias sobre pessoas vivendo com HIV. As variáveis contextuais: índice de desenvolvimento humano (IDH) do município de moradia; prevalência municipal de HIV/AIDS e presença de Centro de Testagem e Aconselhamento no município de moradia (CTA). A variável dependente foi realização do teste por busca espontânea. Na análise dos fatores associados utilizou-se modelo multinível de Poisson com intercepto aleatório. ***Resultados:*** Foram observadas variáveis individuais comuns e discordantes associadas ao teste entre homens e mulheres. As variáveis individuais comuns foram o conhecimento de alguém com HIV/AIDS e idade; as discordantes incluíram as relativas à saúde sexual e reprodutiva e violência sexual. Entre os fatores do nível contextual, a presença de CTA e o IDH alto foram associados positivamente com a busca espontânea do teste somente entre as mulheres. ***Conclusão:*** A busca espontânea pelo teste anti-HIV é marcada pelas diferenças de gênero, com lacunas de testagem entre mulheres casadas e homens heterossexuais.

Palavras-chave: Sorodiagnóstico da AIDS. Vulnerabilidade. Gênero.

INTRODUCTION

Early diagnosis of HIV infection is a priority for controlling the HIV epidemic, but diagnosis can often be delayed, especially among men[1]. Strategies to promote client-initiated HIV testing have been instrumental to shortening the time between diagnosis and treatment initiation, thereby reducing morbidity/mortality and the risk of HIV transmission due to undetectable viral load[2,3].

Delays are primarily owed to a lack of coverage in HIV testing and differences in reasons for testing between men and women[4]. In Brazil, a national household survey (n = 11,052; age 15 – 64 years) showed that 55.3% of females and 72.7% of males had never been tested for HIV. As for their reasons for testing, 53% of women reported being tested during routine prenatal care, i.e., provider-initiated, whereas 53% of men said they spontaneously sought testing, i.e., client-initiated[4].

In Canada, there were different reasons for HIV testing between men and women. Higher rates of client-initiated testing were found among men who have sex with men (MSM), in low-income populations and individuals living in large urban centers. Single, separated, divorced or widowed women were more likely to seek testing spontaneously[5,6].

Some multi-level studies have also shown association between HIV testing at individual level and at contextual levels. A study conducted with men and women in Los Angeles, USA, found higher testing rates, regardless of the reasons for testing, among people from areas with high-perceived risk, as assessed by contextual-level variables. Areas with high-perceived risk were defined as those with a greater proportion of respondents who reported not always

using condoms and having more than one sexual partner in the past year. Gender was not associated with HIV testing[7].

This study aimed to analyze the association between client-initiated HIV testing and individual- and contextual-level factors among men and women in Brazil.

METHOD

A population-base survey was conducted in 2005 in a sample of the Brazilian population comprising 5,040 people living in urban areas. This interview survey was part of a larger study entitled "Sexual Behavior and Perceptions of the Brazilian Population concerning HIV/AIDS"[8].

A stratified multi-stage sample with unequal probabilities based on census tracts according to the Brazilian Institute of Geography and Statistics[9] was used. Four geographic areas were defined: North/Northeast; Midwest/Southeast excluding the state of São Paulo; South; and the state of São Paulo. Stratification was carried out in four stages for the States (primary sampling unit: microregion; secondary sampling unit: urban census tract defined by IBGE for the 2000 Demographic Census; tertiary sampling unit: private household; quaternary sampling unit: individual aged between 16 and 65 years), excluding capital cities, and in three stages for the microregions of capital cities[8].

INDEPENDENT INDIVIDUAL- AND CONTEXTUAL-LEVEL VARIABLES

INDIVIDUAL-LEVEL

1. Sociodemographic characteristics: gender (for stratified sampling), age; self-reported skin color; marital status; religion; and literacy and schooling level;
2. Variables related to sexual and reproductive health, and experiencing sexual violence: age at first intercourse; Condom use during first intercourse and type of partnership: condom use during last intercourse; type of sexual partnership; number of sexual partners in lifetime; history of STIs; biological children; sexual violence;
3. Variables related to knowledge of and attitudes toward HIV/AIDS: self-perceived risk; HIV/AIDS treatment knowledge and beliefs; being personally acquainted with a person with HIV/AIDS; and holding discriminatory ideas about people living with HIV: attitudes of apartheid and exclusion of people with AIDS;

Contextual-level variables included: Human Development Index (HDI) of the municipality, categorized as "high" for scores ≥ 0.8 and "low" for scores < 0.8. The AIDS prevalence ratio was estimated using the base year of 2005, in which prevalence in the municipality was defined as "low" when categorized as $\leq 25^{th}$ and as "high" for $> 25^{th}$ percentile. The presence of CT services available in the municipality was associated with the responses "yes" or "no".

The dependent variable (HIV testing) was categorized as "no testing", "client-initiated" regarding last test.

Client-initiated testing was defined as: self-motivated or motivated by fear of infection, injection drug use, free testing available at health facilities, partner's tattooing or request, and sexual abuse. This classification was based on the guidance on voluntary HIV testing issued by the Joint United Nations Program on HIV/AIDS[10].

STATISTICAL ANALYSIS

Data were adjusted for primary sampling units and strata. The variables were described using absolute and relative frequencies. The hypothesis test employed was Pearson´s Chi-squared test. Poisson regression models with random intercepts were designed to estimate associated factors for women and the multiple Poisson regression model or complex sample data was devised for men. In the multilevel analysis of factors associated with client-initiated testing among women, the null model was ($rho = 2.3$ $p < 0.05$) and among men the multilevel analysis was not conducted because there was no significant contextual-level variance in the null model ($rho = 0.02$; $p = 0.108$). The reference dependent variable in all models was "no testing."

The independent variables with $p < 0.20$ in the bivariate analysis were included in the multiple model of hierarchical context data. Each group of individual-level variables was analyzed separately and mediation and confounding variables were identified. The variables that were not significant and did not adjust for any other variables were removed from partial models. Specifically, within the group of individual-level variables, sociodemographic variables were entered first, followed by those related to sexual and reproductive health and knowledge. After the partial analyses, four multiple models were constructed with level-1 variables (individual-level) entered first — in which the large number of variables ensures more accurate measures, followed by the contextual-level (municipality of residence) variables. Individual-level variables were included in groups, as described for partial models. The significance level was set at 5%.

Finally, the likelihood ratio test for adjustment was used in all models. The variance fit the null model for other models successively, with intraclass correlation coefficient being close to 0 in the final model.

This study was approved by the Research Ethics Committee of the School of Public Health, Universidade de São Paulo.

RESULTS

A population of 5,040 Brazilians, comprising 2,298 men and 2,742 women, aged 16-65 years, living in urban areas was analyzed. Only data on individuals who were sexually active was included.

Of all sexually active individuals (4,760), half were women, 70.3%, aged ≥ 45 years, 87.5% white or brown-skinned, whereas 45.1% had elementary school and 33.4% had high school education. Most respondents (61.6%) were married or living with a partner and predominantly (64.2%) reported being Catholic.

Regarding sexual and reproductive health, the majority (60.2%) reported having first unforced sexual intercourse sexual at the age of > 15 years, being heterosexual (98%), not having had STI (82.1%) or experienced a situation of violence (93.6%). 32.1% did not use a condom at the first and 60.2% at the last sexual intercourse, 62.3% had more than 3 sexual partners, and 45.1% had biological children aged ≥ 6 years.

The majority (65.8%) did not perceive themselves as being at risk for HIV, 78% had knowledge about AIDS treatment, and 72.2% did not hold discriminatory ideas about people living with HIV / AIDS. Most respondents (54.5%) were not acquainted with other people living with HIV / AIDS.

Lastly, most lived in a municipality with a high HDI (62.5%), high HIV / AIDS prevalence (78.9%) and CT services (75.5%).

Most respondents had never been tested for HIV (2,969, 62.4%). Of those who had been tested (n = 1,791), 30.8% had undergone client-initiated testing and 78% reported the reason was self-motivated.

A comparison between men and women showed testing was more prevalent among individuals who were male, younger (≤ 35 years), single, divorced or widowed, with no religion or Spiritist, did not use a condom during the first sexual intercourse, had a non-steady partner, used a condom at the last sexual intercourse, had a higher number of sexual partners in lifetime, were homosexual or bisexual and had biological children aged > 6 years.

FACTORS ASSOCIATED WITH TESTING

WOMEN

In the bivariate analysis, the variables positively associated with HIV testing among women included at the individual-level were: sociodemographic characteristics (16-55 years of age, married, high school and college education); sexual and reproductive health (condom use or non-use during last sexual intercourse, more than two sexual partners, history of STIs, biological children aged ≤ 6 years and experiencing sexual violence before the age of 15), and knowledge of and attitudes toward HIV / AIDS (perceived risk, HIV / AIDS treatment knowledge and beliefs, personally acquainted with a person with HIV / AIDS, and non-discriminatory ideas). At the contextual level, the variables included: HDI and availability of CT services. The negatively associated variables were: brown skin color, marital status (separated or widowed), being Catholic, non-use of condom during first sexual intercourse with steady partner, reported heterosexual partnership (Table 1).

Table 1. Crude and adjusted prevalence ratios of variables associated with client-initiated HIV testing among women. Brazil. 2005 (n = 1710).

Variables	Bivariate analysis		Model 1		Model 2	
Individual	PR	95%CI	PR	95%CI	PR	95%CI
Age (years)						
56 – 65	1		1		1	
46 – 55	1.85	(1.0 – 3.3)	1.5	(0.8 – 2.7)	1.6	(0.8 – 2.9)
36 – 45	2.8	(1.6 – 4.9)	1.87	(1.0 – 3.3)	2.06	(1.2 – 3.6)
26 – 35	4.55	(2.6 – 7.8)	2.51	(1.4 – 4.5)	2.99	(1.7 – 5.3)
16 – 25	3.4	(1.9 – 5.9)	2.18	(1.1 – 4.2)	2.48	(1.3 – 4.7)
Skin color						
White	1		ns		ns	
Brown	0.74	(0.5 – 0.9)	ns	ns	ns	ns
Black	0.96	(0.6 – 1.6)	ns	ns	ns	ns
Others	0.96	(0.5 – 1.9)	ns	ns	ns	ns
Marital status						
Married / partner	1					
Single	1.91	(1.4 – 2.6)	ns		ns	
Separated / widowed	1.69	(1.2 – 2.3)	ns	ns	ns	ns
Religion						
None/do not know	1		ns		ns	
Catholic	0.61	(0.4 – 0.9)	ns	ns	ns	ns
Traditional Evangelical	0.57	(0.3 – 1.1)	ns	ns	ns	ns
Pentecostal	0.67	(0.3 – 1.1)	ns	ns	ns	ns
Spiritist	1.12	(0.6 – 1.9)	ns	ns	ns	ns
Schooling level						
Illiterate	1		1		ns	
Elementary	1.87	(0.9 – 3.9)	1.29	(0.6 – 2.7)	ns	ns
High	3.53	(1.7 – 7.3)	1.67	(0.8 – 3.5)	ns	ns
College or higher	4.67	(2.2 – 9.8)	2.36	(1.1 – 5.1)	ns	ns
Age at first intercourse						
Do not know	1		ns		ns	
≤ 15 and unforced	2.13	(0.7 – 6.9)	ns	ns	ns	ns
≤ 15 and forced	2.27	(0.6 – 7.8)	ns	ns	ns	ns
> 15 and unforced	1.21	(0.4 – 3.8)	ns	ns	ns	ns
> 15 and forced	1.52	(0.4 – 5.1)	ns	ns	ns	ns
Condom use during first intercourse						
No / non-steady partner	1		ns		ns	
No / steady partner	0.48	(0.3 – 0.8)	ns	ns	ns	ns
Yes / non-steady partner	0.91	(0.3 – 2.5)	ns	ns	ns	ns
Yes / steady partner	0.87	(0.5 – 1.5)	ns	ns	ns	ns
Condom use during last intercourse						
Not applicable	1		ns		ns	
No	1.46	(1.0 – 2.1)	ns	ns	ns	ns
Yes	2.34	(1.6 – 3.4)	ns	ns	ns	ns

Continue...

Table 1. Continuation.

Variables	Bivariate analysis		Model 1		Model 2	
Individual	PR	95%CI	PR	95%CI	PR	95%CI
Number of sexual partners in lifetime						
1	1		1		1	
2	1.69	(1.1 – 2.5)	1.53	(1.0 – 2.3)	1.58	(1.0 – 2.4)
3 – 5	2.63	(1.9 – 3.7)	1.9	(1.4 – 2.7)	1.97	(1.4 – 2.8)
> 5	3.56	(2.5 – 5.1)	2.36	(1.6 – 3.4)	2.47	(1.7 – 3.6)
Type of sexual partnership						
Homosexual / bisexual	1		ns		ns	
Heterosexual	0.32	(0.1 – 0.7)	ns	ns	ns	ns
History of STIs						
No / do not know	1		ns		ns	
Yes	1.49	(1.1 – 2.0)	ns	ns	ns	ns
Children						
No	1		1			
Yes. ≤ 6 years	1.48	(1.0 – 2.1)	1.67	(1.1 – 2.4)	1.56	(1.1 – 2.2)
Yes. > 6 years	0.67	(0.5 – 0.9)	1.15	(0.8 – 1.7)	1.02	(0.7 – 1.5)
Sexual violence						
No	1		1		1	
Yes. before the age of 15 years	2.61	(1.7 – 4.0)	1.68	(1.1 – 2.6)	1.57	(1.0 – 2.4)
Yes. after the age of 15 years	1.33	(0.9 – 1.9)	1.09	(0.8 – 1.6)	1.03	(0.7 – 1.5)
Perceived risk						
No	1		1		ns	
Yes	1.88	(1.4 – 2.4)	1.17	(0.9 – 1.5)	ns	ns
Personally acquainted with a person with HIV/AIDS						
No	1		1		1	
Yes, family	2.8	(1.8 – 4.3)	2.24	(1.4 – 3.5)	2.17	(1.4 – 3.3)
Yes, friends / acquaintances	2.16	(1.6 – 2.8)	1.75	(1.3 – 2.3)	1.81	(1.4 – 2.4)
HIV/AIDS treatment						
No	1		1		1	
Yes, it makes no difference	1.69	(0.6 – 4.8)	1.34	(0.5 – 3.8)	1.18	(0.4 – 3.3)
Yes, it cures	2.1	(0.9 – 5.1)	2.17	(0.9 – 5.3)	1.91	(0.8 – 4.7)
Yes, it improves health	3.19	(1.8 – 5.6)	2.15	(1.2 – 3.8)	2.28	(1.3 – 4.0)
Discriminatory ideas						
Yes	1		ns		ns	
No	1.63	(1.2 – 2.1)	ns	ns	ns	ns
HDI						
Low–medium	1				1	
High	1.69	(1.2 – 2.3)			1.59	(1.2 – 2.1)
HIV/AIDS prevalence						
Low	1				ns	
High	1.34	(0.9 – 1.9)			ns	ns
CT services						
No	1				1	
Yes	2.08	(1.4 – 3.0)			1.64	(1.1 – 2.4)

LR test null mod: final model <0.001; ns: not significant.

In the multiple analysis, marital status was no longer significant. The other sociodemographic variables (age ≤ 55 years and schooling level (high school and college education) and those related to sexual and reproductive health remained positively associated with testing, as did HIV/AIDS treatment knowledge and beliefs, and being personally acquainted with a person with HIV/AIDS. HDI and availability of CT services were associated with client-initiated HIV testing among women. No relevant adjustments of the magnitude of prevalence ratios of the variables in the final model were evident (Table 1).

Table 1 shows variance fit in the null model for other models successively, with intraclass correlation coefficient being close to 0 in the final model. Furthermore, the null model likelihood ratio test for the final model was statistically significant. The random coefficient model indicated a good fit with independent variables and can largely explain the outcome.

MEN

In Table 2, the variables positively associated with HIV testing among men included sociodemographic characteristics (age 26 – 35 years, high school and college education), sexual

Table 2. Crude and adjusted prevalence ratios of variables associated with client-initiated HIV testing among men. Brazil. 2005 (n = 1771).

Variables	Bivariate analysis		Multiple analysis	
Sociodemographic	PR	95%CI	PR	95%CI
Age (years)				
56 – 65	1		1	
46 – 55	1.71	(0.9 – 3.1)	1.52	(0.8 – 2.7)
36 – 45	1.72	(0.9 – 3.1)	1.53	(0.9 – 2.6)
26 – 35	2.3	(1.3 – 3.9)	1.98	(1.2 – 3.4)
16 – 25	0.89	(0.5 – 1.7)	0.72	(0.4 – 1.4)
Skin color/ethnicity				
White	1		1	
Brown	0.71	(0.5 – 0.9)	0.87	(0.6 – 1.2)
Black	1.29	(0.9 – 1.9)	1.51	(0.9 – 2.3)
Others	1.87	(0.9 – 3.6)	2.34	(1.4 – 3.9)
Schooling level				
Illiterate	1		1	
Elementary school	1.85	(0.7 – 4.9)	1.67	(0.6 – 4.4)
High school	2.93	(1.1 – 7.8)	2.72	(1.0 – 7.2)
College or higher	4.83	(1.8 – 13.1)	4.17	(1.6 – 11.0)

Continue...

Table 2. Continuation.

Variables	Bivariate analysis		Multiple analysis	
Sociodemographic	PR	95%CI	PR	95%CI
Number of sexual partners in lifetime				
1	1		ns	
2	1.52	(0.6 – 3.9)	ns	ns
3 – 5	1.36	(0.6 – 2.8)	ns	ns
> 5	1.85	(0.9 – 3.6)	ns	ns
Type of sexual partnership				
Homosexual / bisexual	1		1	
Heterosexual	0.33	(0.2 – 0.5)	0.46	(0.3 – 0.7)
History of STIs				
No / do not know	1		ns	
Yes	1.44	(1.0 – 2.1)	ns	ns
Sexual violence				
No	1		ns	
Yes, before the age of 15 years either repeated or not thereafter	1.82	(0.9 – 3.8)	ns	ns
Yes, after the age of 15 years	1.56	(1.0 – 2.4)	ns	ns
Perceived risk				
No	1		ns	
Yes	1.38	(1.1 – 1.8)	ns	ns
Personally acquainted with a person with HIV/AIDS				
No	1		1	
Yes, family	2.99	(1.6 – 5.5)	2.04	(1.2 – 3.4)
Yes, friends / acquaintances	2.12	(1.6 – 2.8)	1.79	(1.3 – 2.4)
HIV/AIDS treatment knowledge and beliefs				
No	1		ns	
Yes, it makes no difference	1.37	(0.6 – 3.3)	ns	ns
Yes, it cures	1.99	(0.8 – 4.7)	ns	ns
Yes, it improves health	1.94	(1.2 – 3.2)	ns	ns
Discriminatory ideas about people with HIV/AIDS				
Yes	1		ns	
No	1.55	(1.2 – 2.0)	ns	ns

and reproductive health (history of STIs, experiencing sexual violence after the age of 15), knowledge of and attitudes toward HIV / AIDS (perceived risk, personally acquainted with a person with HIV / AIDS, HIV / AIDS treatment knowledge and beliefs and discriminatory ideas). Brown skin color and being heterosexual were negatively associated with testing.

In the multiple model, age (26-35 years) and schooling (high school and college education) remained positively associated with testing. Brown and black skin color were no longer significant and other skin colors were positively associated with the condition. Being bisexual or homosexual and being personally acquainted with a person with HIV / AIDS was also positively associated with testing (Table 2).

DISCUSSION

Being personally acquainted with a person with HIV / AIDS, i.e., being close to an HIV-infected person at any point, from infection to AIDS development, was associated with greater rates of testing, irrespective of gender or reason for testing. This life experience may contribute to individuals perceiving themselves at risk for HIV infection, leading them to seek more knowledge about treatment and to improve self-care practices. Such finding was also observed among adult men and women in Italy[11].

Age was another major factor found to be associated with higher testing in men (26-45) and women (16-55). We can conclude that client-initiated testing is more frequent during life stages in which people are more sexually and reproductively active. Conversely, younger males (16-25) and older men (> 45 years) and women may be less likely to seek testing and benefit from early diagnosis[11,12]. In a population-based survey carried out in nine sub-Saharan African countries, lower testing rates were found among older (aged 50 or above) respondents, irrespective of reasons for testing, as well as lower levels of knowledge about testing, AIDS treatment, and condom use[13]. These findings point to poorer knowledge and lower use of services promoting sexual health, which may have a negative impact on STI and / or HIV prevention and testing among older adults.

A comparison of the variables associated with client-initiated testing between men and women showed that testing was determined by social constructions, in which heterosexual men were less likely to seek HIV-testing than other men and women. This lower testing level may be related with hegemonic masculinity. In the dominant model of manhood and hegemonic masculinity, heterosexual men present themselves as strong and invulnerable, which translates into irregular condom use and not seeking HIV testing. Despite knowing about HIV infection, this group believes to be invulnerable and makes a clear distinction between being aware of high-risk behaviors and being vulnerable to HIV infection. This distinction is a key element of hegemonic masculinity in which men engage in high-risk behaviors as a way of showing their power over women and other men[11,14]. These social constructions affect perceived vulnerability to HIV infection; for example, these individuals perceive themselves as more vulnerable when having sex with men or engaging in casual sex[11,15].

Among women, the positive association for client-initiated testing can be explained by reproductive age (15–45 years) and a stronger focus on general health prevention compared to men. Among younger males, lower rates of client-initiated testing may be a result of fear of getting tested, as noted by Nel et al. (2013)[16] after examining reasons for the nonadherence to testing for HIV among MSM aged 16–25 years.

Also regarding reproductive health, higher testing rates among women who have children younger than 6 years-old and more than one sexual partner highlight the social construction of greater concern with reproductive health, resulting in regular visits to health services and in cases of perceived risk. In addition, women's care for their children and family explains the greater proportion of women seeking testing among those with young children[14].

Another factor encouraging self-care and care for one's family is the knowledge about the AIDS treatment. Being aware of the AIDS treatment is also a determining factor for client-initiated testing among women. Other studies have also observed an association of good knowledge about HIV / AIDS with client-initiated testing[6,17]. Having knowledge about HIV infection and treatment can reduce fear of death in case of positive test results and help overcome psychological barriers to testing.

Gender roles are key for understanding sexual violence experienced before the age of 15 years, repeated or not thereafter, through adult life among women. Female victims of violence during childhood are more vulnerable in their adult life. They are more likely to engage in unprotected sex, which may be attributed to difficulties in negotiating condom use with male partners. They are also repeatedly exposed to violence perpetrated by their partners[17-21], and may use more health care services[22]. Client-initiated testing may reflect health concerns as these women perceive themselves at risk for HIV exposure because they have a history of non-consensual sex and use of health services as part of self-care.

Understanding the influence of contextual-level aspects on individual-level factors among women, and of schooling among men, helps to inform HIV prevention and treatment, improving knowledge and increasing HIV testing rates. Pharris et al. (2011)[17] reported a positive association of testing with high income, living in urban areas and having a high schooling level. Living in a neighborhood with good basic education and socioeconomic conditions may have a positive impact on health-related attitudes at an individual level and promote women's empowerment.

The context-individual mechanism for seeking testing involves factors other than schooling level and socioeconomic conditions in the area of residence, which may be similar to social constructions of AIDS.

Finally, client-initiated testing among women was found to be positively associated with local availability of CT services. Such services provide access to testing, especially among low-income groups, and improve access to information about HIV during prevention campaigns. Leibowitz et al. (2007)[12] reported higher testing rates among people living near testing facilities.

The availability of CT services within the area of residence had a positive impact on client-initiated testing among men and women. Health service users have greater access

to information about prevention, including the importance of getting tested for HIV, and easier access to testing.

The discussion of our data posed a challenge because of the heterogeneity of contexts in which HIV transmission occurs. The AIDS pandemic comprises different regional sub-epidemics. In Africa, for instance, the HIV epidemic is widespread, with a prevalence of HIV infection of 1-5% among pregnant women and over 5% in the general population[23]. Brazil has a concentrated epidemic with a prevalence of HIV infection of less than 1% in the general population and 5% or higher in specific subpopulations[24].

In addition to the heterogeneity of the AIDS epidemic, male and female sexual behaviors vary depending on cultural contexts and social constructions. Thus, comparability across studies and generalization of results are limited.

Few studies[7,12] have used similar methods of analyzing clusters and related variables, hampering comparisons of the influence of contextual-level variables on individual-level variables across regions. However, the current findings were comparable to those of other studies with regard to individual- and contextual-level variables.

This study was based on data from a large survey that primarily examined sexual behaviors and secondarily investigated HIV testing. Thus, one of the main limitations of the present study was that the date of HIV testing — the dependent variable — and test results were not available. This information would allow the determination of the testing timeline, estimation of the prevalence of AIDS by area of residence, in addition to potential comparisons between sexual behaviors and HIV-positive results, enabling causal inferences to be drawn.

Moreover, limited data on condom use was available, making it difficult to examine consistent condom use by type of sexual partnership.

The sample selection used in this study made it difficult to assess proximity of the area of residence to CT services in each municipality. The selection of smaller segments of clusters might have provided more details on the area of residence in the multilevel analysis. However, despite this limitation, we were able to identify an association of higher testing rates with availability of CT services in the municipality.

Finally, although our data was collected in 2005, the associations of factors identified in the present study proved to be similar to those reported in recent international studies, despite differences in methods and scope. This highlights the relevance of our study in describing the profile of sexually active individuals undergoing client-initiated or provider-initiated HIV testing and identifying contextual-level factors in the multifaceted HIV epidemic in Brazil.

CONCLUSIONS

There are different patterns in HIV testing among men and women and the present findings point to gender as a category of analysis[25]. In this study, we showed how individual- and contextual-level factors differ between men and women in client-initiated HIV testing. Client-initiated testing is more prevalent among men, and being acquainted with a person with HIV /

AIDS encourages testing. Client-initiated testing motivated by high perceived risk (MSM, more sexual partners and sexual violence) is in line with the particularities of the concentrated epidemic in Brazil. Conversely, there is a lack of testing among heterosexual men and married women. Finally, health service availability is a facilitator for seeking testing among women.

Importantly, health-related behaviors built upon social constructions of gender roles are key for understanding factors that directly or indirectly influence client-initiated testing.

REFERENCES

1. Mukolo A, Villegas R, Aliyu M. Wallston KA. Predictors of late presentation for HIV diagnosis: a literature review and suggested way forward. AIDS Behav. 2013;17(1):5-30.
2. Grangeiro A, Escuder MM, Menezes PR, Alencar R, Ayres de Castilho E. Late Entry into HIV Care: Estimated Impact on AIDS Mortality Rates in Brazil, 2003–2006. PLoS ONE. 2011 Jan 25;6(1):e14585.
3. UNAIDS. UNAIDS/WHO Policy Statement on HIV Testing [Internet]. 2004 [cited on 2017 Sep 12]. Available from: http://data.unaids.org/una-docs/hivtestingpolicy_en.pdf
4. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Departamento de DST, Aids e Hepatites Virais. Pesquisa de conhecimento, atitudes e práticas na população brasileira de 15 a 64 anos [Internet]. 2016 [cited on 2017 Sep 12]. Available from: http://www.aids.gov.br/pt-br/pub/2016/pesquisa-de-conhecimentos-atitudes-e-praticas-na-populacao-brasileira-pcap-2013
5. Kaii S, Bullock S, Burchell AN, Major C. Factors that affect HIV testing and couseling services among heterosexuals in Canada and the United Kingdom: An integrated review. Patient Educ Couns. 2012;88:4-15.
6. Ziraba A, Madise N, Kimani J, Oti S, Mgomella G, Matilu M, et al. Determinants for HIV testing and counselling in Nairobi urban informal settlements. BMC Public Health. 2011;11(1):663.
7. Taylor SL, Leibowitz A, Simon PA, Grusky O. Zip code correlates of HIV-testing: a multilevel analysis in Los Angeles. Aids Behav. 2006;10(5):578-86.
8. Bussab WO, Grupo de estudos em populações, sexualidade e aids. Plano amostral da pesquisa nacional sobre comportamento sexual e percepções sobre HIV/Aids, 2005. Rev Saúde Pública. 2008;42(Suppl. 1):12-20.
9. Brasil. Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2000: Características da População e dos Domicílios: Resultados do universo [Internet]. 2000 [cited on 2015 Jun 20]. Available from: http://www.ibge.gov.br/home/estatistica/populacao/censo2000/
10. The UN Refugee Agency, World Health Organization, Joint United Nations Programme on HIV/AIDS. Policy Statement on HIV Testing and Counselling in Health Facilities for Refugees, Internally Displaced Persons and other Persons of Concern to UNHCR [Internet]. 2009 [cited on 2014 June 22]. Available from: http://www.unhcr.org/4b508b9c9.pdf
11. Renzi C, Zantedeschi E, Signorelli C, Osborn JF. Factors associated with HIV testing: results from na Italian general population survey. Prev Med. 2001;32:40-8.
12. Leibowitz AA, Taylor SL. Distance to Public test sites and HIV testing Med Care Res Rev. 2007;64:568-84.
13. Negin J, Nemser B, Cuming R, Lelerai E, Amor YB, Pronyk P. HIV Attitudes, Awareness and Testing among older adults in Africa. Aids Behav. 2012 Jan;16(1):63-8.
14. Coutenay WH. Constructions of masculinity and their influence on men's well-being: a theory of gender and health. Soc Sci Med. 2000;50:1385-401.
15. Parker CM, Garcia J, Philbin MM, Wilson PA, Parker RG, Hirsch JS. Social risk, stigma and space: key concepts for understanding HIV vulnerability among black men who have sex with men in New York City. Cult Health Sex. 2017;19(3):323-37.
16. Nel JA, Yi H, Sandfort TGM, Rich E. HIV-untested men who have sex with men in South Africa: The perception of not being at risk and fear of being tested. Aids Behav. 2013;17(01):51-9.
17. Pharris A, Chuc NTK, Tishelman C, Brugha R, Hoa NP, Thorson A. Expanding HIV Testing Efforts in Concentrated Epidemic Settings: A Population-Based Survey from Rural Vietnam. PLoS One. 2011 Jan 11;6(1):e16017.
18. Roberts AL, McLaughlin KA, Conron KJ, Koenen KC. Adulthood Stressors, History of Childhood Adversity, and Risk of Perpetration of Intimate Partner Violence. Am J Prev Med. 2011 Feb;40(2):128-38.
19. Selic P, Pesjak K, Kersnik J. The prevalence of exposure to domestic violence and the factors associated with co-occurrence of psychological and physical violence exposure: a sample from primary care patients. BMC Public Health. 2011;11(1):621.

20. Sunday S, Kline M, Labruna V, Pelcovitz D, Salzinger S, Kaplan S. The Role of Adolescent Physical Abuse in Adult Intimate Partner Violence. J Interpers Violence. 2011 May 20;26(18):3773-89.
21. Teixeira SAM, Taquette SR. Violence and unsafe sexual practices in adolescents under 15 years of age. Rev Assoc Med Bras. 2010;56(4):440-6.
22. Schraiber LB, Barros CRS, Castilho EA. Violência contra as mulheres por parceiros íntimos: usos de serviços de saúde. Rev Bras Epidemiol. 2010;13(2):237-45.
23. UNAIDS. Global Aids update. 2016 [cited on 2016 Jun 10]. Available from: www.unaids.org
24. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim Epidemiológico HIV/AIDS. 2016 [cited on 2016 Jun 25]. Available from: www.aids.gov.br
25. Scott J. Gênero: uma categoria útil para a análise histórica. Educ Realidade. 1995;20:71-99.

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