HIV/Aids knowledge and associated factors among men who have sex with men in Belo Horizonte, MG

Conhecimento sobre HIV/Aids e fatores associados entre homens que fazem sexo com homens em Belo Horizonte, MG

Raquel Regina de Freitas Magalhães Gomes[1], Maria das Graças Braga Ceccato[2], Gustavo Machado Rocha[3], Mark Drew Crosland Guimarães[4]

[1] Dental Surgeon, Epidemiologist. Master of Public Health. Municipal Health Office of Belo Horizonte. Doctoral Student in Public Health, Department of Preventive and Social Medicine, School of Medicine, Universidade Federal de Minas Gerais – UFMG. Belo Horizonte, MG – Brazil.
[2] Biochemical Pharmacist. PhD in Public Health. Adjunct Professor with the Department of Social Pharmacy, School of Pharmacy, UFMG. Belo Horizonte, MG – Brazil.
[3] Infectologist. Master of Public Health. Professor at Universidade Federal de São João Del-Rei, Divinópolis. Doctoral student in Public Health, Department of Preventive and Social Medicine, School of Medicine, Universidade Federal de Minas Gerais. Belo Horizonte, MG – Brazil.
[4] Physician. PhD in Epidemiology. Associate Professor with the Department of Preventive and Social Medicine, School of Medicine, Universidade Federal de Minas Gerais. Belo Horizonte, MG – Brazil.

ABSTRACT

Introduction: HIV/Aids knowledge has been found low among men who have sex with men (MSM). The lack of knowledge proves detrimental to VIH prevention efforts and goes beyond individual characteristics. **Objective:** To analyse the social, individual and structural factors associated with low HIV/Aids knowledge in MSM sample of adults and residents of Belo Horizonte, Minas Gerais. **Methods:** Cross-sectional study that occurred between 2008 and 2009 with MSM recruited through Respondent Driven Sampling (RDS). HIV/Aids knowledge was ascertained through ten statements by face-to-face interview and scores were obtained using Item Response Theory (IRT).The association between the explanatory variables and low HIV/Aids knowledge was analysed using binomial logistic regression. **Results:** It was observed that 24.5% of MSM had low knowledge on HIV/Aids and independent associated factors were: Social, not currently working and not being encouraged by friends to use condoms; Individual, not knowing their chance of becoming infected with HIV, irregular condom use in receptive anal sex with any partner in the last six months and not feeling, or little feeling, sadness or depression; Structural, to participate in religious activity and not knowing any Aids related NGO. **Conclusion:** Our results indicate an important gap in knowledge regarding basic information about the modes of transmission and prevention of HIV among MSM in Belo Horizonte. An adequate level of HIV/Aids knowledge is essential for improving risk perception and the adoption of safe sexual practices among MSM. Actions directed towards social, individual and structural factors among this key population are urgently needed.

Key words: HIV; Acquired Immunodeficiency Syndrome; Sexual Behavior; Health Knowledge, Attitudes, Practice.

RESUMO

Introdução: o conhecimento sobre o HIV/Aids tem sido encontrado baixo entre os homens que fazem sexo com homens (HSH). A falta de conhecimento mostra-se prejudicial para os esforços de prevenção do HIV e vai além das características individuais. Objetivos: analisar os fatores sociais, individuais e estruturais associados ao baixo conhecimento em HIV/Aids na amostra de HSH adultos e residentes de Belo Horizonte. Métodos: estudo de corte transversal conduzido em 2008-2009, com 274 HSH recrutados pela técnica amostral do Respondent Driven Sampling (RDS). O conhecimento em HIV/Aids foi avaliado a partir de 10 afirmativas da entrevista realizada face a face e os escores foram estimados pela Teoria de Resposta ao Item (TRI). A associação entre as variáveis explicativas e o baixo conhecimento em HIV/Aids foi analisada utilizando-se a regressão logística binomial. Resultados: observou-se que 24,5% de HSH apresentaram conhecimento mínimo em HIV/Aids e os fatores associados foram: sociais, não trabalhar e ter nenhum ou poucos amigos que incentivam o uso de preservativos; individuais,

não saber quais as chances de se infectar com o HIV, uso irregular de preservativo em relação anal receptiva com qualquer tipo de parceria nos últimos seis meses e nunca ou pouco sentir-se triste ou deprimido; estruturais, participar de atividade religiosa e não conhecer algum grupo organizado ou ONG. **Conclusões:** *Os resultados revelam importante lacuna no conhecimento em relação às informações básicas sobre as formas de transmissão e prevenção do HIV entre HSH em Belo Horizonte. Adequado nível de conhecimento sobre HIV/ Aids é aspecto fundamental para melhorar a percepção de risco e motivação para a adoção de práticas do sexo seguro entre HSH. São necessárias ações direcionadas aos fatores sociais, individuais e estruturais voltadas para essa população-chave.*

Palavras-chave: HIV; Síndrome de Imunodeficiência Adquirida; Comportamento Sexual; Conhecimentos, Atitudes e Prática em Saúde.

INTRODUCTION

HIV/AIDS knowledge is among the main indicators used for monitoring the HIV epidemic proposed by the United Nations General Assembly Special Session (UN-GASS). In countries with concentrated epidemics, as is the case of Brazil, the focus is on key populations at higher risk of exposure to HIV, such as men who have sex with men (MSM).[1] In countries of low and middle income knowledge and self-perceived risk for infection have been found to be low among MSM, leading to inconsistent use of condoms and lack of HIV testing.[2] The lack of knowledge proves harmful to HIV prevention efforts. In Brazil, the promotion of safe sex and the dissemination of correct information about the modes of transmission and HIV prevention are structural components prevention policies. However, the dynamics of the epidemic has shown that protection against infection is not limited to a purely cognitive act. Instead, there are a number of factors that determine the possibilities of each person or group to protect themselves, i.e., there are different contexts that make individuals more vulnerable to HIV infection.[3]

There are scarce epidemiological studies that focused on HIV knowledge in Brazil within this wider context of the epidemic among MSM. A study of the general population, comparing the years 1998 and 2005, it was observed that there was no significant increase in the minimum knowledge about HIV among young people 16-24 years old, and, in addition, there was an increase in the proportion of those who reported no risk for HIV.[4] Another study indicated better knowledge in socioeconomic classes A/B, com-

pared with D/E, and among those living in urban as compared to rural areas.[3] The social dynamics of the epidemic has shown different patterns in the Brazilian regions where the schooling level is cited as an important factor that influences the quality of knowledge on HIV/AIDS, since a higher educational level stimulates demand for specific knowledge about the disease.[5] In a previous study, we evaluated the level of HIV/AIDS knowledge, a national multicenter study of MSM in ten Brazilian cities by item response theory (IRT).[6] The results indicated that 40.7% of the sample had knowledge levels below the average.

This view that the impact of social determinants, i.e., conditions in which people are born, live and work are important influences on health, reflects an increasingly understanding shared by researchers and practitioners.[7] Some argue that HIV risk environment is a product of an interaction between social and structural factors, but where political and economic factors may play a predominant role.[8] Structural level interventions, which promote health and alter the environment where individuals participate in health-related behaviors, are identified as more successful than those which focus solely individual actions.[7] However, social and structural interventions often require major changes in legislation, policies, procedures or complex social processes.[9] Review studies have reported that increasing the availability and accessibility of condoms were effective in increasing condom use, providing an effective means of prevention HIV/STI.[10]

Thus, it is essential to assess knowledge on HIV in this wider context of the epidemic, identifying patterns and local differences. In this perspective, in order to better understand the factors that influence HIV risk, this study aims to analyze the social, individual and structural factors associated with low knowledge on HIV/AIDS in a sample of MSM from Belo Horizonte.

METHODS

Study design and participants

This work is part of a national multicenter study, cross-sectional, conducted in 2008-2009, where 3854 MSM of ten Brazilian cities were recruited by Respondent Driven Sampling technique (RDS)[11], detailed in Kerr *et al.*[12] and Guimarães *et al.*[13]. In short, participants should be 18 years or older, have had at

least one sexual relationship with a man in the last 12 months, have presented a valid coupon and signed the inform consent form before the interview. This study was approved by the National Ethics (CONEP No. 14494). In this analysis we present results of 274 MSM residents of Belo Horizonte.

Outcome and explanatory variables

A semi-structured interview was conducted, containing sociodemographic, behavioral, health care, social context and HIV/AIDS knowledge questions. The outcome in this study, i.e., HIV/AIDS knowledge, was based on ten statements (items) on HIV transmission and prevention with three options: *yes*, *no* or *did not know* (Table 1). HIV/AIDS knowledge scores were estimated by two parameter logistic model (difficulty and discrimination) using Item Response Theory (IRT), also known as latent trait theory. Statistical models of IRT takes into account the item in particular, unlike the classical theory, which is based on the total score. IRT assumes that the performance of an individual in a test (item responses) can be explained by unobservable latent characteristics (latent traits or abilities), which in this study is HIV/AIDS knowledge. Thus, in IRT models the probability of an individual giving a correct response to an item depends on the characteristics of the items (difficulty and discrimination parameters) and the level of knowledge of the participant.[13] As this model uses dichotomous responses, the *correct* answers were categorized as "one" and the *incorrect* answers and the answers *did not know* were defined as "zero". For the analysis of associated factors, knowledge scores estimated by TRI were categorized as high and low knowledge. Estimates of knowledge score were obtained in the previous analysis using the total sample (n = 3854) of the national multicenter study.[6]

The potential explanatory variables were evaluated in three mains groups:

- **social:** schooling (years), skin color; marital status, live with, current working, individual monthly income, social class (Criterion Brazil: A-B= higher; C-D-E= middle – lower classes), feeling of discrimination due to sexual orientation, verbal aggression due to sexual orientation, sharing with someone their sexual orientation, friends talk about STD/AIDS prevention, friends encourage condom use;

- **individual:** age (years); age at first sexual intercourse (years), self-reported sexual identity, number of sexual partner in the last six months, use of places or services to find sexual partners in the last month, use of condoms during receptive anal intercourse with any kind of partner in the last six months, chance of getting infected with HIV, binge drinking in the last six months (5 or + alcoholic drinks in one occasion), sexual intercourse under the influence of alcohol or illicit drugs, previous diagnosis of sexually transmitted diseases (STD) in the last 12 months, feeling sad or depressed;

- **structural:** participation in religious activity or in health service activities, knowledge about NGO working with AIDS, prior HIV or syphilis testing, received free condoms in the last month, received lubricant gel in last 12 months. Other specific definitions can be seen in Guimarães *et al.* (2014). [13]

Statistical analysis

Initially, descriptive analysis of categorical variables and measures of central tendency of continuous variables were performed. The level of knowledge was assessed by the frequency distribution of knowledge scores obtained by TRI.[6] The 25th percentile was defined as the cutoff for grouping the scores into low and high knowledge. The estimates were weighted by the harmonic mean of the inverse of each respondent social network size reported.[15] The association between the explanatory variables and low HIV/AIDS knowledge was analyzed using binomial logistic regression. Differences in proportions were evaluated using the chi-squared test with significance level of 0.05. The odds ratio (OR) with 95% confidence interval (95% CI) was used as measure of association between the variables in each group and the outcome of interest, i.e., low knowledge. In the univariate analysis, the variables that showed significance level p<0.20 were included in the multivariate model. Sequential deletion of variables occurred according to the statistical significance presented, remaining in the final model only those with a level of significance p<0.05. Fit of the final model was evaluated using Hosmer-Lemeshow test.[16] We used BILOG MG software, version 3.0.2[17] for the estimation of knowledge scores and item parameters, and SAS 9.0 software (SAS Institute Inc., Cary, NC, USA) for binomial logistic regression.

Table 1 - Descriptive characteristics of the sample of men who have sex with men. Belo Horizonte, 2010

Itens	Correct response	Incorrect response	Did not know
1. A person can acquire HIV through insect bites. e.g. mosquito.	94.5	2.2	3.3
2. A person can acquire HIV by using public toilets.	95.5	1.5	3.0
3. A person can acquire HIV from sharing a syringe or needle.	100.0	0.0	0.0
4. A person can acquire HIV if condoms are not used.	100.0	0.0	0.0
5. The risk of HIV infection can be reduced if you have relations only with an uninfected partner.	81.2	16.6	2.2
6. A healthy person can be infected with HIV.	98.2	1.1	0.7
7. A person can become infected by sharing eating utensils, cups or food.	98.5	1.5	0.0
8. The risk of HIV positive mothers infecting their babies is small if she receives treatment in pregnancy and childbirth.	80.4	7.4	12.2
9. The risk of transmitting HIV is small if one follows the treatment correctly.	16.2	72.0	11.8
10. People are using less condoms because of the AIDS treatment.	33.2	61.3	5.5

RESULTS

The descriptive characteristics of the sample of MSM population of Belo Horizonte (n=274) are presented in Guimarães *et al.*, (2014).[12] The analysis of the knowledge items indicated a high proportion of correct responses for the eight items that ranged from 80 to 100% (Table 1). However, the proportion of correct response was too low for the items "*The risk of transmitting HIV is small if one follows the treatment correctly*"(16.2%) and "*People are using less condoms because of AIDS treatment*" (33.2%). The IRT analyses showed that among the 274 MSM in Belo Horizonte approximately 24.5% had low HIV/AIDS knowledge.

The results of the univariate analysis (Table 2) show that among the social factors, schooling between 12 and 14 years of study and no current work were associated with low knowledge. Among individual factors, age ≤24 years old, having less than five sexual partners in the last six months, no knowing ones chance of getting infected with HIV, binge drinking, feeling some or no sadness or depression. Regarding structural factors, we found significant association with low knowledge, to have participated in religious activity and not knowing any NGO working with AIDS.

In the final multivariate model (Table 3) the following factors were independently associated (p ≤ 0.05) with low HIV/AIDS knowledge:

- **social:** no current work, and having none or few friends who encouraged the use of condoms;
- **individual:** not knowing ones chance of becoming infected with HIV, irregular condom use during receptive anal intercourse with any kind of partner in the last six months and feeling some or no sadness or depression;

- **structural:** participate in religious activity and no have knowledge about NGO working on AIDS.

DISCUSSION

This is the first study to use psychometric model IRT for measuring the level of knowledge and RDS sampling technique to recruit a MSM population in Belo Horizonte. The results showed a worrying proportion (24.5%) of MSM in Belo Horizonte with minimal knowledge regarding basic information about the HIV modes of transmission and prevention, despite the high schooling and socioeconomic status of the sample. This result was similar to the percentage found (26%) in the overall study sample involving ten cities.

With respect to social factors, the increased risk of low knowledge was found among individuals who reported not to be working when compared to those who were working at the time of the survey. We emphasize the high schooling level among MSM evaluated in our study, and as a chance to have low knowledge predominated among young MSM (≤ 24 years old), with 12 to 14 years of study, it is likely that the work environment may have contributed to increase knowledge, probably due to a greater access to the media, greater interaction and integration with different people. The study by Cruzeiro *et al.*[18] with young adolescents found an association between paid work and delayed sexual initiation, indicating that work among young people may increase autonomy and greater responsibility about life, and, thus, an indirect protective factor to risk behavior.

Table 2 - Univariate analysis of the social, individual and structural factors and low HIV/AIDS knowledge among men who have sex with men, Belo Horizonte, MG

Factors	Total[1] (n=274)	Low Knowledge n (%)[2]	OR[3] CI (95%)	P- value
Social				
Schooling (years):				
15 +	132	20 (15.4)	1.00	
12-14	66	20 (32.1)	2.60 (1.25 − 5.46)	0.01
≤ 11	74	27 (23.6)	1.70 (0.85 − 3.45)	0.13
Skin color:				
White	117	33 (25.3)	1.00	
Non-white	152	34 (20.0)	0.74 (0.41 − 1.31)	0.30
Marital status:				
Single	235	56 (21.5)	1.00	
Married/Union	35	11 (28.5)	1.45 (0.65 − 3.23)	0.35
Live with:				
Alone	45	8 (19.1)	1.00	
Partner/other	105	29 (20.7)	1.11 (0.47 − 2.76)	0.82
Parents	120	30 (25.0)	1.41 (0.60 − 3.48)	0.43
Currently working:				
Yes	223	53 (19.7)	1.00	
No	47	14 (37.3)	2,42 (1.17 − 5.01)	0.01
Individual Monthly Income:				
>=R$ 1300	108	20 (17.8)	1.00	
R$ 750 − 1299	76	22 (23.2)	1.39 (0.66 − 2.92)	0.38
<R$ 750	87	25 (26.3)	1.65 (0.83 − 3.31)	0.15
Social Class:				
A-B	170	34 (19.2)	1.00	
C-D-E	100	33 (27.2)	1.57 (0.88 − 2.80)	0.13
Discrimination due to sexual orientation:				
No	164	36 (19.8)	1.00	
Yes	110	31 (26.7)	1.47 (0.81 − 2.66)	0.20
Verbal aggression due to sexual orientation:				
No	103	25 (24.4)	1.00	
Yes	167	42 (20.8)	0.81 (0.46 − 1.46)	0.49
Sharing with someone sexual orientation:				
Yes	250	62 (22.1)	1.00	
No	19	5 (24.6)	1.16 (0.43 − 3.14)	0.78
Friends talk about STD/AIDS prevention:				
All/most	98	19 (15.4)	1.00	
Few/none	173	48 (25.4)	1.87 (0.96 − 3.62)	0.06
Friends encourage condom use:				
All/most	156	32 (19.1)	1.00	
Few/none	115	35 (25.8)	1.47 (0.83 − 2.62)	0.19
Individual				
Age (years):				
>24	159	31 (17.0)	1.00	
<=24	113	36 (29.3)	2.02 (1.13 − 3.61)	0.02

Continues…

… continuation

Table 2 - Univariate analysis of the social, individual and structural factors and low HIV/AIDS knowledge among men who have sex with men, Belo Horizonte, MG

Factors	Total[1] (n=274)	Low Knowledge n (%)[2]	OR[3] CI (95%)	P- value
Individual				
Age at first sexual intercourse (years):				
>18	62	7 (17.3)	1.00	
15 – 18	129	34 (25.2)	1.61 (0.79 – 3.47)	0.20
<=14	79	26 (21.8)	1.34 (0.58 – 3.12)	0.50
Self-reported sexual identity:				
Gay	110	19 (16.2)	1.00	
MSM/Homosexual	132	38 (23.8)	1.62 (0.82 – 3.35)	0.17
Bisexual/other	28	10 (28.7)	2.09 (0.85 – 5.14)	0.11
Number of sexual partner in the last six months:				
+5	79	26 (8.6)	1.00	
2-5	131	30 (24.6)	3.46 (1.26 – 12.54)	0.03
1	58	11 (25.8)	3.70 (1.29 – 13.69)	0.03
Use places or services to find sexual partners in the last month:				
No	161	47 (25.6)	1.00	
Yes	109	20 (17.0)	0.60 (0.32 – 1.11)	0.10
Use of condoms during receptive anal intercourse with any partner in the last six months:				
Always	160	36 (19.0)	1.00	
Irregular	109	31 (28.3)	1.68 (0.94 – 3.02)	0.08
Chances of getting infected with HIV:				
Know	226	53 (20.1)	1.00	
Don't Know	35	14 (43.6)	3.07 (1.50 – 6.28)	0.00
Binge drinking in the last six months:				
No	169	39 (18.3)	1.00	
Yes	101	28 (29.5)	1.87 (1.05 – 3.36)	0.03
Sexual intercourse under the influence of alcohol:				
No	83	20 (24.3)	1.00	
Yes	187	47 (21.0)	0.83 (0.46 – 1,48)	0.53
Sexual intercourse under the influence of illicit drugs				
No	214	51 (21.6)	1.00	
Yes	55	16 (25.8)	1.26 (0.59 – 2.71)	0.55
STD[4] diagnosis in the past 12 months:				
No	205	49 (19.8)	1.00	
Yes	66	18 (29.8)	1.72 (0.91 – 3.26)	0.09
Feeling sadness or depression:				
Some/a lot	144	28(16.5)	1.00	
Never/little	126	39 (29.2)	2.09 (1.16 – 3.74)	0.01
Structural				
Participation in religious activity:				
No	198	41 (17.7)	1.00	
Yes	73	26 (31.9)	2.17 (1.20 – 3.93)	0.01
Participation in healthy services activities:				
Yes	37	6 (15.3)	1.00	
No	234	61 (23.1)	1.66 (0.63 – 4.38)	0.30

Continues…

… continuation

Table 2 - Univariate analysis of the social, individual and structural factors and low HIV/AIDS knowledge among men who have sex with men, Belo Horizonte, MG

Factors	Total[1] (n=274)	Low Knowledge n (%)[2]	OR[3] CI (95%)	P- value
Structural				
Knowledge about NGO[5] working with AIDS:				
Yes	139	25 (16.4)	1.00	
No	132	42 (28.5)	2.03 (1.13 – 3.65)	0.02
Prior HIV testing:				
Yes	201	44 (19.7)	1.00	
No	69	23 (30.6)	1.80 (0.95 – 3.39)	0.07
Prior syphilis testing:				
Yes	91	16 (19.3)	1.00	
No	167	51 (24.9)	1.39 (0.75 – 2.58)	0.30
Received free condoms in the last month:				
Yes	210	51 (19.6)	1.00	
No	61	16 (30.9)	1.83 (0.96 – 3.49)	0.06
Received lubricant gel in last 12 months:				
Yes	70	18 (19.8)	1.00	
No	201	49 (22.9)	1.20 (0.61 – 2.38)	0.60

[1] Excluding missing values.
[2] Number and weighted proportions.
[3] Weighted Odds ratios,(95% Confidence Interval).
[4] STD = Sexually transmitted diseases.
[5] NGO = Non-governmental organizations.

Table 3 - Final multivariate logistic regression of the social, individual and structural factors and low HIV/AIDS knowledge among MSM. Belo Horizonte, MG

Factors	OR[1] CI (95%)	P value
Social		
Currently working:		
Yes	1.00	
No	3.25 (1.34 – 7.97)	0.009
Friends encourage condom use:		
All/most	1.00	
Few/none	2.26 (1.16 – 4.48)	0.020
Individual		
Chance of getting infected with HIV:		
Some risk	1.00	
Does not Know	4.92 (2.10 – 11.78)	0.0003
Use of condoms during receptive anal intercourse with any partner in the last six months:		
Always	1.00	
Irregular	2.98 (1.48 – 6.14)	0.003
Feeling sadness or depression:		
Some/a lot	1.00	
Never/little	5.49 (2.55 – 12.63)	<0.0001

Continues…

… continuation

Table 3 - Final multivariate logistic regression of the social, individual and structural factors and low HIV/AIDS knowledge among MSM. Belo Horizonte, MG

Factors	OR[1] CI (95%)	P value
Structural		
Participation in religious activity:		
No	1.00	
Yes	4.20 (2.06 – 8.85)	0.0001
Knowledge about NGO[2] working with AIDS:		
Yes	1.00	
No	2.10 (1.08 – 4.18)	0.031

[1] Weighted Odds ratios,(95% Confidence Interval).
[2] NGO = nongovernmental organization.

Hosmer and Lemeshow Goodness-of-Fit Test - Chi-Square = 10.0769; DF=7; p= 0.1843.

Also related to the group of social factors, having none or few friends that encourage the use of condoms was found to be associated with low knowledge, which may indicate the relevance of social interaction as a means of protection. According Hosek & Zimet[19], adolescents often become attached to a specific peer group and begin to conform to the

norms of that group who offer them a network of social and emotional support. Due to fear of criticism, they often depend on the group's approval of their choices, views and behaviors. This rigid conformity of the peer group has been shown as a factor that influences adolescence risk behavior, including sexual initiation, sexual behavior and substance use.

Among the individual factors associated with low knowledge, it is of concern the existence of individuals who are unaware of their chance of becoming infected with HIV because this favors sexual behavior that increases exposure to HIV. The irregular condom use in receptive anal sex with any partnership, also associated with low knowledge, emphasizes the extent of this problem. On the other hand, the association between feeling some or no sadness or depression with low knowledge may be a marker of risk perception. Not knowing ones perception, or having low risk perception, may not have immediate effect on the mental health of this population. In addition, the characteristic omnipotence of younger ages induces a feeling of invulnerability, thus increasing exposure to risks without realizing due consequences.[20] However, these findings point to the low effectiveness of mass campaigns, educational and information materials distributed and, mainly, to limited access of this population to health services. Prior study reported that MSM at higher risk (HIV-positive, with a history of STD, 10 or more sexual partners) are those likely to be in contact with prevention activities of health services.[21]

Among the structural factors, individuals who attended religious activities showed higher chance of having low knowledge. Several studies have shown that religion, family and other social groups, strongly affect their attitudes and support different sets of norms regarding sexuality. Religion is seen ambiguously. On the one hand, it is considered the main force against an increase in tolerance towards homosexual practices,[22] and this may be a barrier for access to information on promotion and prevention HIV. On the other hand, religious practice has been identified as protective factor among young people with regard to relation to early sexual initiation, contributing to a greater selectivity of sexual partners and, thus, a lower risk of STD.[18]

Similarly, those who did not know any organized group or NGO had lower HIV knowledge. The successful achievements of the AIDS program in Brazil are in part due to the commitment and the active role of NGO with promoting HIV infection prevention.[23]

Although several NGO are directed to key populations such as MSM, this association may indicate that NGO mobilizations in Belo Horizonte are not reaching this particular group of MSM, i.e., young adults with higher schooling, but this may also reflect a lack of identification of this population with local NGO.

Some considerations about the study should be mentioned. First, there is no standard cutoff point for a critical level of knowledge on HIV in the literature in order to correctly classify participants with high, reasonable, poor or low knowledge. The guidelines for the construction of core indicators proposed by UN-GASS[24] presented five questions to assess knowledge about the modes of HIV transmission in key populations based on classical analysis, i.e., the percentage of respondents who correctly answer the five questions on HIV. However, there are no standard methods among studies that assessed knowledge, which makes it impossible to compare knowledge scores across different studies. In our study, we used a statistical cutoff point, i.e., percentile of the scores, which we consider to be easily understood. In addition, we emphasize that TRI technique provides item parameter estimates that are "invariant" in different groups -once knowledge score is measured on the same scale, and this allows proper comparison among different times and populations.[14] Thus, it is possible to generate an important indicator for monitoring and evaluation of the HIV epidemic in key populations at the right time.

CONCLUSION

This study showed a worrying proportion of MSM who have no adequate knowledge about HIV/AIDS. In particular, young people stood out among those with less knowledge about the modes of transmission of HIV, being more vulnerable to HIV, as shown by the recent data of the epidemic in Brazil.[25] These young people occupy a fragile social position, thus requiring care and specific actions to be promoted not only by the State but also by civil society. We emphasize the need for an urgent response focused on specific strategies for health promotion and HIV prevention for this particular group, with greater investment in schools, in communities, in health services and NGOs.

Regional and local differences are shown not only in the prevalence of HIV infection in the country, but also with regard to AIDS related health policies. Differences in responses to the AIDS epidemic including the local

health system capacities, local cooperation among actors, different degrees of discrimination against key populations, among others, generate heterogeneity of municipal AIDS programs that potentially impact the desired results.[23] Although a good knowledge alone is not sufficient for the adoption of protective measures, accurate and specific information about HIV/AIDS may benefit the sexual health of MSM, impacting in the attitudes that promote health and wellbeing. In this sense, it is necessary that public policies be implemented in order to monitor and evaluate HIV/AIDS knowledge in this and other key populations in their social, individual and structural dimensions.

ACKNOWLEDGMENTS

REFERENCES

1. Barbosa Junior A, Pascom ARP, Szwarcwald CL, Dhalia CBC, Monteiro L, Simão MBG. Indicadores propostos pela UNGASS e o monitoramento da epidemia de Aids no Brasil. *Rev Saúde Pública*. 2006; 40(Supl):94-100.

2. Adam PCG, de Wit JBF, Toskin I, Mathers BM, Nashkhoev M, Zoblotska I, *et al.* Estimating levels of HIV testing, HIV prevention coverage, HIV knowledge, and condom use among men who have sex with (MSM) in low-income and middle-income countries. *J Acquir Immune Defic Syndr*. 2009; 52(Suppl2):S143-51.

3. BRASIL. MINISTÉRIO DA SAÚDE. Secretaria de Vigilância em Saúde. Departamento de DST, Aids e Hepatites Virais. PCAP-2008 - Pesquisa de Conhecimentos, Atitudes e Práticas na População Brasileira de 15 a 64 anos, 2008. Brasília: 2011.

4. Ferreira MP. Nível de conhecimento e percepção de risco da população brasileira sobre o HIV/Aids, 1998 e 2005. *Rev Saúde Pública*. 2008; 42(Supl 1):65-71

5. Irffi G, Soares RB, De Souza AS. Fatores socioeconômicos, demográficos, regionais e comportamentais que influenciam no conhecimento sobre HIV/AIDS. *Economia.* 2010; 11(2): 333-56.

6. Gomes RRFMG, Batista JR, Ceccato MGB, Kerr LRFS, Guimarães MDC. HIV/AIDS Knowledge among men who have sex with men in Brazil: applying the item response theory. 2014; Rev Saúde Pública (*In Press*)

7. Adimora AA, Auerbach JD. Structural Interventions for HIV Prevention in the United States. *J Acquir Immune Defic Syndr.* 2010; 55(Suppl.2):S132-S135.

8. Rhodes T, Singer M, Bourgois P, Friedman SR, Strathdee SA. The social structural production of HIV risk among injecting drug users. *Social Science & Medicine*. 2005; 61(5):1026-1044.

9. Blankenship KM, Friedman SR, Dworkin S, Mantell JE. Structural Interventions: Concepts, Challenges and Opportunities for Research. *Journal of Urban Health*: Bulletin of the New York Academy of Medicine. 2006; 83(1):59-72.

10. Charania MR, Crepaz N, Guenther-Gray C, Henny K, Liau A, Willis LA, Lyles CM. Efficacy of Structural-Level Condom Distribution Interventions: A Meta-Analysis of U.S. and International Studies, 1998–2007. *AIDS Behav.* 2011; 15:1283-1297.

11. Heckathorn DD. Respondent-driven sampling: a new approach to the study of hidden populations. *Soc Probl.* 1997; 44(2):174-99.

12. Kerr LS, Mota RS, Kendall C, *et al.* HIV among MSM in a large middle-income country. *AIDS*. 2013; 27(3):427–435.

13. Guimarães MDC, Ceccato MGB, Gomes RRFM, Rocha GM, Camelo LV, Carmo RA, Acurcio FA. Vulnerabilidade e fatores associados com HIV e sífilis em homens que fazem sexo com homens, Belo Horizonte, MG. *Rev Med Minas Gerais.* 2014 (In Press).

14. Pasquali, L., Primi, R. Fundamentos da teoria da resposta ao item-TRI. *Avaliação Psicológica*. 2003; 2(2):99-110.

15. Heckathorn DD. Respondent-driven sampling II: deriving valid population estimates from chain-referral samples of hidden populations. *Social problems*. 2002; 49(1):11-34.

16. Hosmer DW, Lemeshow S. Goodness-of-fit tests for the multiple logistic regression model. *Comm Statist Theory Meth* 1980; 9(10): 1043–69.

17. Scientific software international. IRT from SSI: BILOG-MG, MULTILOG, PARSCALE, TESTFACT. Lincolnwood: Edited by Mathilda du Toit, 2003.

18. Cruzeiro ALS, Souza LDM, da Silva RA, Horta BL, Muenzer RM, Faria AD, Pinheiro RT. Iniciação Sexual Entre Adolescentes de Pelotas, Rio Grande do Sul. *Rev Bras Crescimento Desenvolv Hum*. 2008; 18(2):116-125.

19. Hosek SG, Zimet GD. Behavioral Considerations for Engaging Youth in HIV Clinical Research. J Acquir Immune Defic Syndr. 2010; 54(Suppl 1):S25-S30.

20. Taquete SR, Ruzany MH, Meirelles Z, Ricardo I. Relacionamento violento na adolescência e risco de DST/Aids. *Cad Saude Publica* 2003; 19(5):1437-1444.

21. McDaid LM, Hart GJ. Contact with HIV prevention services highest in gay and bisexual men at greatest risk: cross-sectional survey in Scotland. *BMC Public Health*. 2010; 10:798.

22. Paiva V, Aranha F, Bastos FI. Opiniões e atitudes em relação à sexualidade: pesquisa de âmbito nacional, Brasil 2005. *Rev Saúde Pública*. 2008; 42(Supl 1):54-64.

23. Le Loup G, Assis A, Couto MHC, Thoenig JC, Fleury S, Camargo Jr K, Larouze´B. A Public Policy Approach to Local Models of HIV/AIDS Control in Brazil. *Am J Public Health*. 2009; 99(6):1108–1115.

24. UNGASS. United Nations General Assembly Special Session on HIV/AIDS. Monitoring the Declaration of Commitment on HIV/AIDS: Guidelines on Constructions of Core Indicators: 2008 reporting. Geneva: UNAIDS, 2008.

25. Brasil. Ministério da Saúde. Secretaria de Vigilância em Saúde. Boletim Epidemiológico HIV-Aids. Ano 1. Número 1. 2012. Acessível em 28/11/2013: http://www.aids.gov.br/sites/default/files/anexos/publicacao/2012/52654/boletim_2012_final_1_pdf_21822.pdf