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Relative risk for AIDS between homo/bisexual and heterosexual men

ABSTRACT

OBJECTIVE: To assess the relative risk for AIDS between men who have sex with other men and heterosexual men.

METHODS: Estimates on the proportion of men who have sex with men in Brazil and AIDS data from Brazil's Information System for Notifiable Diseases, were utilized. Estimates were calculated for the relative risk (RR) for AIDS of men who have sex with men with respect to heterosexual masculine population in Brazil; state and city of São Paulo; and state and city of Rio de Janeiro, from 1996 to 2003. The trajectory of the RR in this period was also analyzed.

RESULTS: The estimates for relative risk decreased, with a tendency to stabilize: from 34.3 to 19.3 in the entire country and from 32.1 and 6.3 in the locations analyzed. In the country in 2003, the relative risk of bisexual men in relation to heterosexual men was 16.0. The RR for exclusive homosexuals had a decreasing trajectory in all of the locations studied, but not for the bisexual population.

CONCLUSIONS: In all locations, the relative risk for men who have sex with other men was higher in relation to heterosexual men. This result indicates a high and persistent vulnerability among this population.

DESCRIPTORS: Acquired Immunodeficiency Syndrome. Homosexuality, Male. Heterosexuality Health. Sexual Behavior. Risk Factors. Vulnerability.

INTRODUCTION

The number of notified AIDS cases in homosexual/bisexual males or men who have sex with other men (MSM) corresponds to 79,286 according to the *Sistema de Informação Nacional de Agravos de Notificação*[a] (SINAN – National Information System for Notifiable Diseases) for the period between 1980 and 2006. This System reports a total of 261,190 AIDS cases in the male population, of which 51,006 pertain to the category of ignored exposure, or rather 30% of the reported cases and 37% of the cases in the category with known exposure.

The decreasing tendency of the number of AIDS cases in the MSM population and the increase in the heterosexual population decreased the stigma of MSM in relation to AIDS. However, it has also led to this population being a lesser focus of specific public policies. As such, it was only in June of 2007 that the *Programa Nacional de DST-Aids* (PN-DST-AIDS –National STD-AIDS Program) opened a public consultation on a National Plan to Confront the AIDS Epidemic and other STDs among gays, MSM, and transvestites.

[a] Boletim Epidemiológico DST-AIDS. Brasília, DF: Ministério da Saúde; 2006;3(1).

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The stigma associated with the MSM population continues: publicity campaigns directed at reducing stigma towards MSM have been censured, the law proposing civil union has not been voted on and MSM are even prohibited from donating blood.

While the epidemiological data is available, the annual incidence rate of AIDS among the MSM population in Brazil has not yet been calculated. One reason is the difficulty in obtaining data about the homosexual/bisexual population. Some recent estimates of the MSM adult population can be used to provide a base for calculations of HIV or AIDS incidence. In 1995, Binson et al[1] estimated this population in the United States to be between 5% and 7%. Cáceres et al[2] (2006), in a literature review, presented diverse estimates regarding the proportion of MSM in developing countries, varying between 2.5% and 48.5%. A recent study of the Health Ministry in Spain[a] (2003) affirms that 3.9% of men between 18 and 49 declared to have had homosexual relations at some point in their life and the male sexually active population in this age bracket was 94.6%; 1.1% of the men declared having exclusive homosexual relationships.

Berquó et al[b] (2000) estimated that men who had at least one male partner in the last five years constituted 2.5% of the population between 15 and 49, or one in every 40 men in Brazil.

According to Szwarcwald et al[3] (2004) the proportion of the sexually active male population between 15 and 49 that had at least one partner during their life of the same sex is 3.5%, representing 1,538,621 men. Using the estimate of the MSM population and the SINAN[c] AIDS data (2006) from the known exposure category, the incidence rate for MSM in the year 2004 would be 237 cases for 100,000 people a year. The incidence rate for heterosexual men would be between 12.3 cases per 100,000 people/year, making the first 19 times higher than the second.

Therefore, the objective of the current article was to analyze the relative risk for AIDS of MSM, including exclusive homosexuals and bisexual males. This data can be used to support public policies for the country, to direct specific actions for this population.

METHODS

The relative risk (RR) for AIDS in the MSM population in relation the male heterosexual population was analyzed based on National STD and AIDS Program and SINAN data for AIDS in the male population between 15 and 49. The data was updated through 06/30/2006 for Brazil, the city and state of São Paulo and the city and state of Rio de Janeiro.[d]

The analysis included the period between 1996 and 2003; 1996 was chosen for being the year that the distribution of triple therapy began in São Paulo, which diminished AIDS morbidity. The analysis is limited to consolidated data up to 2004, as the average delay for notification of cases is two years. The locations were chosen for being the most populous cities in Brazil and with the highest proportion of AIDS cases in this population group.

The calculation for the risk of AIDS relative to sexual exposure (MSM and heterosexual) was determined considering that RR is the ratio of incidences of a determinate event occurring in two groups. The quotient of AIDS incidence rates, RRs, is

R = (AIDScasesin MSM ÷ population MSM) ÷ (AIDScasesinHeterosexuals ÷ Heterosexual population)

Which can be written as:

R = (MSMAIDScases ÷ AIDScasesinheterosexuals) × (Heterosexualpopulation ÷ MSMpopulation)

The first factor is obtained from SINAN, this is the quotient (or ratio) of absolute AIDS cases, called Q. There are diverse estimates for the inverse of the proportion of MSM in relation to the heterosexual male population (second factor) that can be written as:

(heterosexual population ÷ MSMpopulation) = ((1-t) × p) ÷ (t × p) ,

where

p sexually active male population in the 15-49 age bracket and t = a proportion of *p* that corresponds to MSM.

This factor is (1-*t*)/*t,* this is, independent of the sexually active population *p* and only dependent on the proportion t of the MSM population.

Using the proportion of MSM to t – 3.5% given by Szwarcwald et al[3] (2004), the first estimate of relative risk is defined as:

R 1 = Q × 96.5 ÷ *3.5* = *Q* × 27.5

[a] Instituto Nacional de Estadística. Encuesta de salud y hábitos sexuales 2003. Madrid; 2003. [acesso em: 21/04/06]. Disponível em: http://www.ine.es/inebase/cgi/um?M=%2Ft15%2Fp455&O=inebase&N=&L=

[b] Berquó E, Rios Loyola M, Gomes Pinho MD, Ferreira MP, Correa M, Rovery de Souza M, et al. Comportamento Sexual da População Brasileira e Percepções do HIV/AIDS. Brasília: Ministério da Saúde; 2000. Disponível em: http://bvsms.saude.gov.br/bvs/publicacoes/168comporamento.pdf [Série Avaliação, 4].

[c] Ministério da Saúde. Dados de AIDS no Brasil (Banco de dados). Brasília [acesso em: 05/12/06]. Disponível em: http://www.aids.gov.br/final/dados/dados_aids.asp

[d] Centro de Referência e Treinamento DST/AIDS, Centro de Vigilância Epidemiológica, Secretaria de Estado da Saúde do Estado de São Paulo.

The same authors[3] estimate the percentage of male population between 15 and 49 exclusively homosexual and bisexual as 2% and 1.5% respectively. Thus, RR11 is defined as the ratio between the AIDS incidence rates between exclusive homosexuals and heterosexual males or:

$R11 = (AIDScasesexclusiveMSM \div AIDScasesheterosexuals) \times (96.5 \div 2)$

and RR12 is the ratio between the incidence rates between bisexuals and heterosexual males or

$R12 = (AIDScasesbisexuals \div AIDScasesheterosexuals) \times (96.5 \div 1.5)$

The rates informed by Cáceres et al[2] (2006) for Latin America motive a definition of an estimate for a higher proportion of MSM, correspondent to 10% of MSM in the sexually active population.

As such, a second estimate would be:

$R2 = Q \times 9$

RR2 is approximately a third of RR1.

To address the question of the proportion of the MSM population from another angle, another indicator was defined, similar to that used by Szwarcwald[a] (1998). With the goal of introducing the indicator, observe that RR=1 when the incidence rates are equal and the compared populations face the same risk. The indicator would be the value of *t* which corresponds to the value 1 of RR. This is the proportion of AIDS cases in MSM divided by the sexually transmitted AIDS cases in the male population. This indicator is called T (equality rate of relative risk for MSM):

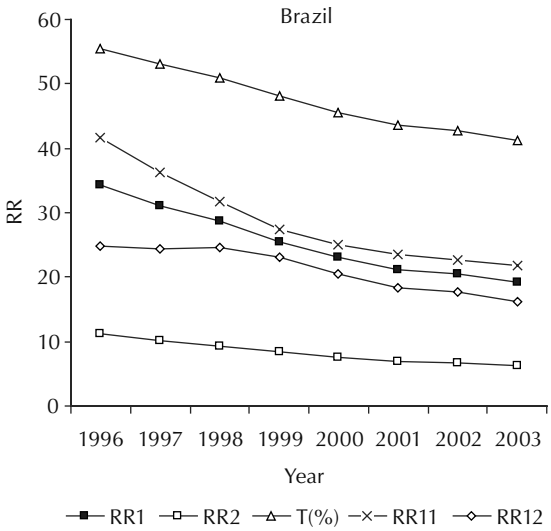
$T = Q \div (1 + Q)$

RESULTS

Table 1 shows the evolution of Q for the chosen locations. Its usefulness resides in the fact that RR1 and RR2 are multiples of Q, and in this way, their trajectory depends on the trajectory of Q. This table shows that, accompanying the trajectory of Q, the decrease of the proportion of MSM cases in the male population in Brazil was sustained over the years. This proportion varied from 1.25 in 1996 to 0.70 in 2003, a decrease of 44.4%. However, RR1 in Figure 1 dropped from 34.4 to 19.3 and RR2 from 11.2 to 6.3 in the period studied. As such, MSM in Brazil had in 2003 an incidence rate six times higher than that of heterosexual males, according to the lower estimate. The decrease of RR11, estimate for the exclusively homosexual population was 48% (from 41 to 21) and RR12, estimate for the male bisexual population was 35% (from 24 to 16). The

Table 1. Annual evolution of quotient Q cases of Aids in MSM/AIDS cases in heterosexual men according to the location studied.

Year	Location				
	Brazil	São Paulo state	City of São Paulo	State of Rio de Janeiro	City of Rio de Janeiro
1996	1.25	0.95	1.45	2.07	2.32
1997	1.13	0.93	1.53	1.83	2.08
1998	1.04	0.90	1.45	1.51	1.67
1999	0.93	0.83	1.15	1.24	1.41
2000	0.84	0.76	1.03	1.23	1.48
2001	0.77	0.75	1.15	1.09	1.31
2002	0.75	0.76	1.14	1.15	1.33
2003	0.70	0.72	1.13	1.02	1.17



RR1: First estimate for relative risk
RR2: Second estimate for relative risk
T: Equality rate for relative risk for MSM
RR11: Relative risk for exclusive homosexual male population
RR12: Relative risk for bisexual male population

Figure 1. Estimates of relative risk for AIDS among men who have sex with other men. Brazil, 1996-2003.

equality rate stayed at 41% of the adult male population. In this sense, in 2003 it would be necessary to consider 41% of the adult male population in Brazil as being MSM to have the same risk for AIDS between the MSM and heterosexual male populations.

In the state of São Paulo, Q varied from 0.95 to 0.72, with a drop of 24% and declining trend. The higher estimate RR1 for MSM varied from 26.05 to 19.76 while RR2, lower estimate, varied from 8.5 to 6.4. The RR11

[a] Szwarcwald CL. Relatório: estimativa da proporção de infectados pelo HIV para homens de 18 a 59 anos segundo a orientação sexual. Brasília: Ministério da Saúde; 1998.

estimate for exclusive homosexuals varied from 33.4 to 22.8 (32% drop), in a decreasing trajectory. Much more irregular in its trajectory, RR12, the estimate for bisexuals varied from 16.3 to 15.7, a drop of 4% reaching a maximum of 20 in 1998. Thus, the decrease of RR in MSM is a composition of the decreases in RR in exclusive homosexuals and bisexuals, the second being lower. Yet, the RR for AIDS in bisexual males was still lower in 2003 than that of exclusive homosexuals. The equality rate T varied from 48.6% to 41.8%. As such, in 2003 the MSM population in the state of São Paulo should be around 41.8% of the adult male population so that we have a RR equal to 1.

In the city of São Paulo, Q varied from 1.45 to 1.13, resulting in a 22% drop. However, the trajectory oscillated, with a maximum value in 1997 and a minimum value in 2000; stabilizing after 2001. Figure 2 shows that RR1 accompanied Q and varied from 39.9 to 31 while RR2 varied from 13 to 10.1. The equality rate T varied from 59.2% to 53%. This means that, it would be necessary that the MSM adult population in São Paulo be 53% in 2003 (higher than the male heterosexual population) for there to be the same risk between the MSM and heterosexual male population. Observe that RR11 varied from 55.3 to 36.3 (32% drop), in a declining trajectory since 2000. In 2001, it increased again and then stabilized at a level higher than that of 2000. RR12 varied from 19.6 to 24.2 with a 23% increase; the minimum of this estimate occurred in 1996. As such, one could affirm that the RR for AIDS in bisexual men is increasing in the city of São Paulo, even though it maintains much level lowers than the RR for AIDS among exclusive homosexuals.

For the state of Rio de Janeiro, Q passed from 2.07 in 1996 to 1.02 in 2003, maintaining a decreasing trajectory and a fall of 50%. Accompanying Q, the higher estimate RR1 varied from 56.9 to 28.2, while RR2 varied from 18.6 to 9.2. The value Q was much higher in 1996 in the state of Rio de Janeiro than in Brazil, in the state of São Paulo and the city of São Paulo. The estimate for exclusive homosexuals varied from 68.1 to 33 (fall of 52%) in a declining trajectory. Slightly more irregular in its fall, an estimate for bisexuals varied from 42.2 to 22 with a drop of 48%. One more time, the RR for AIDS in bisexual males was lower than that of exclusive homosexuals. The equality rate T varied from 67.4% to 50.6%.

In the city of Rio de Janeiro (Figure 3), Q passed from 2.32 in 1996 to 1.17 in 2003, resulting in a drop of 50% and declining trajectory, except for the increase in 2001, and falling again in 2001. The RR1 went from 63.8 to 32.2 while RR2 passed from 20.9 to 10.5. RR11, the estimate for exclusive homosexuals was 79.6 in 1996 and 39 in 2003 (51% drop) in a decreasing trajectory. However, RR12 varied from 43.1 to 23.2 – a 46% drop with an irregular trajectory. The equality rate passed from 69.9% to 54%, or rather, the MSM population in the city of Rio de Janeiro should be above the heterosexual population to make the RR equal to 1.

Table 2 summarizes the situation of Relative Risk in 2003.

DISCUSSION

The present study, as all of those which use secondary data, presents some limitations. The first refers to the definition of AIDS: during the period of analysis in 1998 the definition of AIDS was expanded to include the notification due to a result of CD4 count inferior to 350

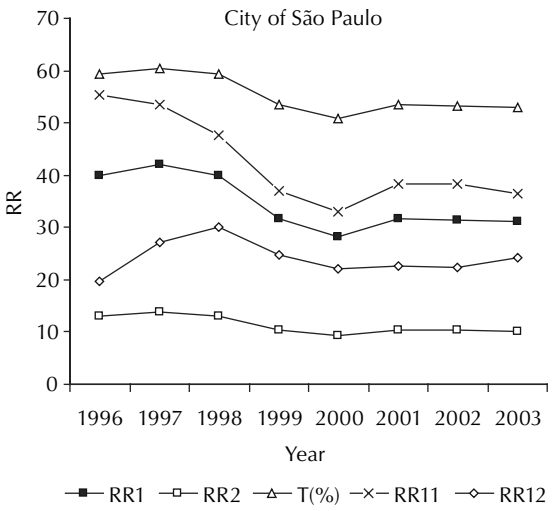


Figure 2. Estimates of relative risk for AIDS among men who have sex with other men. City of São Paulo, 1996-2003.

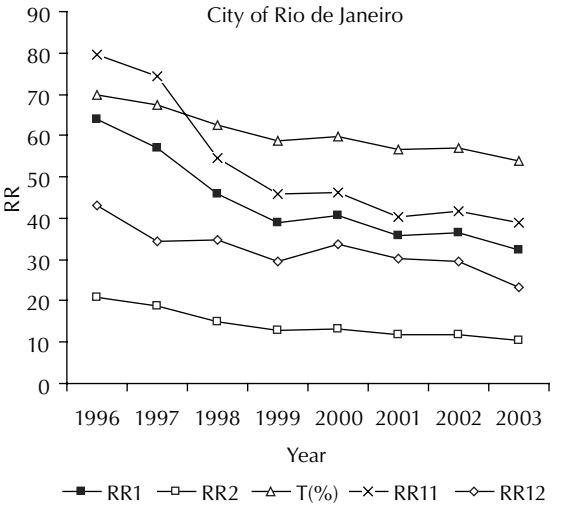


Figure 3. Estimates of relative risk for AIDS among men who have sex with other men. City of Rio de Janeiro, 1996-2003.

Table 2. 2003 estimates of relative risk in the selected locations.

Year 2003	Brazil	State of São Paulo	City of São Paulo	State of Rio de Janeiro	City of Rio de Janeiro
RR1	19.31	19.76	31.08	28.18	32.18
RR2	6.32	6.47	10.17	9.22	10.53
RR11	21.77	22.87	36.33	32.96	39.04
RR12	16.15	15.73	24.28	21.97	23.22
T	41.25	41.81	53.06	50.61	53.92

RR1: First estimate for relative risk
RR2: Second estimate for relative risk
T: Equality rate for relative risk for MSM
RR11: Relative risk for exclusive homosexual male population
RR12: Relative risk for bisexual male population

cells/ml (Criteria for definition of AIDS cases in adults and children[a] 2004). The second is related to the under reporting of AIDS cases and the importance of the proportion of cases in the ignored exposure category. The cases of ignored exposure **(**Boletim Epidemiológico DST-Aids[b] 2006) and underreporting of AIDS cases (Da Costa Oliveira et al[c] 2004) alter in proportion between cities and states. A third limitation is the diversity of definitions of homosexual and bisexual males used in studies that estimate prevalence among this population in Brazil and used to notify AIDS cases. A fourth limitation is that the prevalence rates among the homosexual population during the time studied are assumed to be constant. The prevalence rates of the MSM population in various locations are probably different. Therefore a direct comparison of the same estimate for different places should be conducted with caution.

The results show that the RR remains at very high levels. In 2003 as estimates of RR1 and RR2 reached the same values for Brazil and the state of São Paulo (RR1=19.3 and RR2=6.32). This is, in these locations, the MSM population presents a risk of developing AIDS between 6 and 19 times higher than that of heterosexual men. In other places studied the values are higher. The indicator of equality rate shows that in 2003, to obtain an equal risk of AIDS in Brazil, it would be necessary that at least 41% of the male population be MSM. In the city of Rio de Janeiro, in the state of Rio de Janeiro and in the city of São Paulo, this rate is higher than 50%. In other words, for the risk of AIDS to be equal, the proportion of MSM should be higher than the heterosexual male population in these locations. This high proportion allows us to affirm that MSM in Brazil confront an enormous relative risk for AIDS.

The trajectory of RR for MSM in the period studied differ depending on the location. Two types of behavior can be observed. One is the drop in Brazil, in the state of São Paulo and Rio de Janeiro, with a tendency to stabilize. The city of São Paulo represents a different behavior: the trajectory decreased up to 2000 and stabilized at a level higher than that of 2000.

The results of the present study show a higher RR among exclusive homosexuals than bisexuals. In 2003, the estimate for exclusive homosexuals oscillated between 21.7 in Brazil and 39 in the city of Rio de Janeiro, which signifies that the risk of developing AIDS in Brazil in 2003 was at least 20 times higher than that among heterosexual males. The estimate of RR for bisexual men oscillated between 16 in Brazil and 24 in the city of São Paulo: The risk of developing AIDS in Brazil in 2003 for the bisexual males was at least 15 times higher than that of heterosexual males.

The RR for exclusive homosexuals has a decreasing trajectory in all of the analyzed locations, which was not the same for the RR of bisexuals. Comparing the RR11 (estimate of exclusive homosexuals) from the years 1996 and 2003, we observe that it declines in all locations studied. This did not occur with RR12 (for male bisexuals), which actually increased to 23% in the case of the city of São Paulo.

Therefore, it can be concluded from the data used – and its limitations – that the vulnerability of MSM to AIDS remains at high levels. The causes of this vulnerability, which may include the inadequate prevention of HIV infection in the past, should be a motive for future studies. The late diagnosis of the infection or disease, due to denial or lack of adequate health orientation, is another possibility. In addition, as this epidemic is oldest among the MSM population, some members of this population are probably in treatment for longer periods of time and as such, closer to exhausting the repertoire of existent therapies. In accordance with the results of the present study, some subpopulations of MSM, like exclusive homosexuals and bisexuals, present diverse RR. The cause of this difference remains to be determined, as does the tendency for the increase or lower drop of RR among bisexuals in relation to exclusive homosexuals. The subpopulations of transvestites and commercial sex workers are other segments of the MSM population in which the RR may have a differentiated behavior.

[a] Ministério da Saúde. Secretaria de Vigilância em Saúde. Programa Nacional de DST e Aids.Critérios de definição de casos de AIDS em adultos e crianças. Brasília; 2003. Série Manuais, 60). Disponível em: http://www.aids.gov.br/data/documents/storedDocuments/%7BB8EF5DAF-23AE-4891-AD36-1903553A3174%7D/%7B2A9F7D1C-093E-4A04-8380-84ED432964A5%7D/criterios.pdf
[b] Boletim Epidemiológico DST-AIDS. Brasília, DF: Ministério da Saúde; 2006;3(1)
[c] Oliveira MTC, Barreira D, Santos LCO, Latorre MRDO. A subnotificação de casos de AIDS em municípios brasileiros selecionados: uma aplicação do método de captura-recaptura. Boletim Epidemiológico AIDST. 2004;1(1): 7.

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