HIV infection and related risk behaviors in a community of recyclable waste collectors of Santos, Brazil

ABSTRACT

OBJECTIVE: To estimate the seroprevalence of HIV, hepatitis B and C and syphilis and to describe risk behaviors associated to their transmission among recyclable waste collectors.

METHODS: A seroepidemiological survey was carried out in the city of Santos, Southeastern Brazil, in 2005. A total of 315 individuals were enrolled in the survey, of which 253 subjects underwent serological testing HIV, hepatitis B and C and syphilis. Statistical analysis consisted of univariate and bivariate analyses (cross-tabulation and odds ratio) and multivariate analysis (by logistic regression), relating HIV infection with established risk behaviors and seropositivity.

RESULTS: Overall seroprevalences were: HIV, 8.9%; hepatitis B, 34.4%; hepatitis C, 12.4%; and syphilis, 18.4%. Subjects were characterized by a predominance of males with low educational and economic levels, subjected to parenteral and sexual exposures to HIV and other sexually transmitted infections. Multivariate analysis results indicated that risk factors for both sexually and parenterally related exposure were significantly associated with HIV in this community.

CONCLUSIONS: Seroprevalences found in the study were approximately 10 to 12 times higher than the national average. These communities are socially marginalized and generally not recognized by national programs as potentially endangered populations.

Since the 1970’s, recycling of waste material has acquired an economic and environmental importance and has become a strategic approach for several industries in the production chain (Masui et al. 2000).

As the Brazilian economic crisis aggravated in the 1980’s, in the view of not having an established policy for industrial and residential waste management, thousands of people started to collect waste from the streets and disposal areas and sell it for recycling mills. In Brazil, it is estimated that the number of recyclable waste collectors increased from 150,000 in 1999 to 500,000 in 2004.

There is a well-known strong association between garbage, work and social exclusion (Berthier 2003), which makes this group of informal waste collectors highly vulnerable to a series of risk factors associated to poor health care, as well as to unfavorable social and cultural and environmental factors.

An important aspect that makes this group particularly vulnerable is the fact that most preventative policies related to sexually transmitted infections (STIs) are aimed to groups and populations with higher exposure and does not include those marginal groups living on the streets such as waste collectors.

Therefore, the vulnerability of disadvantaged waste collectors to illicit drugs, unprotected sex, and consequently to HIV infection and other STIs should be investigated and taken into account before planning any intervention targeting this specific risk group.

Since 2002 waste collection has been regulated by the Brazilian Occupational Classification and defined as the act of “collecting, selecting and selling recyclable waste material as paper, cardboard, and glass, as well as ferrous and non-ferrous metals and other recyclable materials”. This job is carried out by autonomous workers organized or not in cooperatives who work at different time schedules. Previous studies pointed to high insalubrity and morbidity associated to this occupation (Hsu et al. 2005). In 1990 the city of Santos carried out a survey on the activities of informal waste collectors and a database was created on this specific community.  

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RESUMO

OBJETIVO: Estimar a soroprevalência de HIV, Hepatites B e C e sífilis e descrever os comportamentos de risco associados à sua transmissão entre coletores autônomos de lixo.

MÉTODOS: Um inquérito soroepidemiológico foi conduzido na cidade de Santos (SP), em 2005. Um total de 315 indivíduos foi incluído no estudo, dos quais 253 submeteram-se a testes sorológicos para HIV, Hepatites B e C e sífilis.

A análise estatística consistiu de análises univariadas e bivariadas (tabulação cruzada e odds ratio) e análise multivariada (por regressão logística), relacionando a infecção por HIV com os fatores de risco estabelecidos e soropositividade.

RESULTADOS: As soroprevalências totais foram: HIV, 8,9%; Hepatite B, 34,4%; Hepatite C, 12,4%; e sífilis, 18,4%. A amostra foi caracterizada por predominância de indivíduos do sexo masculino, com baixos níveis econômicos e educacionais e sujeitos a exposição parenteral e sexual ao HIV e outras doenças sexualmente transmissíveis. Os resultados da análise multivariada indicaram que fatores de risco ligados tanto à exposição sexual quanto à parenteral estão significativamente associados ao HIV nesta comunidade.

CONCLUSÕES: As soroprevalências encontradas no estudo foram aproximadamente 10 a 12 vezes maiores que a média nacional. Estas comunidades são socialmente marginalizadas e geralmente não reconhecidas pelos programas nacionais como populações de risco potencial.

DESCRITORES: Catadores, HIV, Vírus da Hepatite B, Hepacivirus, Sífilis, Fatores de Risco, Estudos Soroepidemiológicos.

INTRODUCTION

Since the 1970’s, recycling of waste material has acquired an economic and environmental importance and has become a strategic approach for several industries in the production chain (Masui et al. 2000).

As the Brazilian economic crisis aggravated in the 1980’s, in the view of not having an established policy for industrial and residential waste management, thousands of people started to collect waste from the streets and disposal areas and sell it for recycling mills. In Brazil, it is estimated that the number of recyclable waste collectors increased from 150,000 in 1999 to 500,000 in 2004.

There is a well-known strong association between garbage, work and social exclusion (Berthier 2003), which makes this group of informal waste collectors highly vulnerable to a series of risk factors associated to poor health care, as well as to unfavorable social and cultural and environmental factors.

An important aspect that makes this group particularly vulnerable is the fact that most preventative policies related to sexually transmitted infections (STIs) are aimed to groups and populations with higher exposure and does not include those marginal groups living on the streets such as waste collectors.

Therefore, the vulnerability of disadvantaged waste collectors to illicit drugs, unprotected sex, and consequently to HIV infection and other STIs should be investigated and taken into account before planning any intervention targeting this specific risk group.

Since 2002 waste collection has been regulated by the Brazilian Occupational Classification and defined as the act of “collecting, selecting and selling recyclable waste material as paper, cardboard, and glass, as well as ferrous and non-ferrous metals and other recyclable materials”. This job is carried out by autonomous workers organized or not in cooperatives who work at different time schedules. Previous studies pointed to high insalubrity and morbidity associated to this occupation (Hsu et al. 2005). In 1990 the city of Santos carried out a survey on the activities of informal waste collectors and a database was created on this specific community.

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A Anais do IV Seminário de Metodologia para Projetos de Extensão [Internet]; 2001 ago 29-31; São Carlos, Brasil; 2001[cited 2008 jul 15]. Available from: http://www.itoi.ufrj.br/sempe/t7p47.htm


In July 2005, a second survey on waste collectors was conducted in the city of Santos. All the city waste collectors (estimated to be around 400 individuals) were required by law to register and sociodemographic and economic information was collected. This survey was used to develop a study on occupational health and prevalence and risk factors for HIV, hepatitis B virus (HBV), hepatitis C virus (HCV) and syphilis in this group. The findings on occupational health will be published elsewhere.

Studies on other disadvantaged populations in Brazil have already been carried out, exploring the occurrence of HIV, Hepatitis B and C and syphilis among male inmates and the identification of parenteral transmission inside Brazilian prisons (Rozman et al. 1998, Massad et al. 1999, Burattini et al. 2000, Burattini et al. 2005); the prevalence and risk factors of HIV and related transmitted infections among intravenous drug users (Carvalho et al. 1996, Massad et al. 1994); the relationship between HIV and HPV infection and the risk for genital neoplasia and high grade lesions among females sex-workers (Gonçalves et al. 1999, Gonçalves et al. 2003, Gonçalves et al. 2003); the risk for HIV and sexual vulnerability of female Brazilian inmates (Strazza et al. 2004, Strazza et al. 2007); the interaction between HIV and HTLV I-II among male prisoners (Segurado et al. 1995); and, finally, HIV and associated infections prevalence and risk behaviors among a disadvantaged youth population (Zanetta et al. 1999). This is the first study on HIV seroprevalence and associated risks addressing this specific group in Brazil.

The aim of the present study was to estimate the seroprevalence of HIV, hepatitis B and C and syphilis, and to describe risk behaviors associated to their transmission among those engaged in informal recyclable waste collection.

**METHODS**

A non-anonymous cross-sectional seroepidemiological survey was carried out in the city of Santos, southeastern Brazil, during June 2005. All informal recyclable waste collectors were invited to partake in the study when attending the municipal call for their annual registration.

Confidentiality was assured and all participants answered a specific questionnaire including questions about sexual behavior, commercial sex work, sexual practices and use of illicit drugs, knowledge of HIV and STI transmission and prevention, blood infections due to work-related injuries, besides sociodemographic information and alcohol consumption. Of 315 individuals enrolled in the survey, 253 agreed to undergo serological testing for HIV, hepatitis B and C and syphilis. The serological test results were individually delivered to subjects.

All interviews were conducted by undergraduate students of Universidade Católica de Santos who were specifically trained for this research. The variables analyzed are detailed in Table 3. Blood samples were obtained by venipuncture using a Vacutainer® system. Sera were extracted by centrifugation at 3000 rpm and stored at -20°C.

The following serological tests were performed with commercial kits from Abbott Laboratories (hepatitis B: total anti-HBc-AxSym®CORE, HBsAg-AxSym®HBsAg (V2), anti-HBs-AxSym®AUSAB), Roche Diagnostics (anti-HIV-Cobas®Core anti-HIV 1+2+O EIA and anti-HCV-Cobas®Core anti-HCV EIA), and Dade Behring Inc. (anti-syphilis- Enzygnost®Syphilis and VDRL cardiolipin-antigen). Confirmatory testing for HIV was performed with Cambridge Biotech HIV-1 Western Blot kit by REM Ltd. HIV infection was defined according to the Brazilian Ministry of Health algorithm. Any positive results in the serological tests for HBV, HCV and syphilis were considered an indication of previous exposure (infection) to those agents.

Statistical analysis consisted of univariate and bivariate analyses (cross-tabulation and odds ratio) using EpiInfo version 6, and multivariate analysis (by logistic regression) using SPSS, version 15.0, relating HIV infection with established risk behaviors and HBV, HCV and syphilis seropositivity.

All participants who agreed to participate in the study signed an informed consent form, and then individual interviews and blood testing were carried out. The study protocol was approved by the Research Ethics Committees of Universidade de São Paulo and Universidade Católica de Santos Medical Schools.

**RESULTS**

The sample comprised 315 informal recyclable waste collectors, 271 (86%) males and 44 (14%) females. Data from 315 individuals of the sample were used to describe demographic characteristics. This choice was because most of these characteristics were not included in the HIV risk analysis (Table 3). The HIV risk analysis included only data from 253 subjects who agreed to undergo testing. Of them, 251 were tested for HIV and 250 for hepatitis B, C and syphilis.

Mean age was 42.4 years old, without any significant differences between males and females. There was a predominance of the age group 30 to 50 years and 25.7% were over 50. Mean formal education was 4.36 years and 10% were illiterate. Only 16.8% had complete elementary schooling (four years of education). As for alcohol consumption, 108 (42.6%) reported not drinking, 77 (30.5%) reported drinking 1-3 times per month and 68 (26.6%) reported drinking daily. As

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for housing, 17.5% reported living in waste deposits, 17.5% lived on the streets, and 57.5% either rented or owned their residence.

Those who reported working five years or more as waste collectors were 46.6% and the mean length they worked in this activity was 6.52 years. Only 15.8% worked as waste collectors for less than one year. Eighty-four percent earned up to US$ 300.00 per month, with an average income rate of US$ 200.00 per month, but 46% earned less than the monthly minimum wage, equivalent to US$ 150.00.

As for risk of blood infection, 35% reported previous work-related injuries such as cuts, contractures and contusion of arms and legs. These are probably due to no use of protection equipment since 77.2% reported never using gloves and 53% worked without any foot protection, wearing plain sandals only.

With respect to sexual behavior, 43.3% of the subjects had their first sexual intercourse before the age of 15. In the year previous to the survey, 52% reported never using condoms during sex, 8% reported using condoms only sometimes and only 30% reported always using condoms. As for the distribution of the number of sexual partners during their lifetime, Table 1 shows an even distribution in four intervals with their respective HIV prevalence. It can also be noted a trend towards an increasing risk of HIV infection with the number of sexual partners in life, although not significant at the 5% level. In the risk analysis, these data were aggregated into two categories and having more than 20 sexual partners was set as a cut off value because it represented an increased risk of HIV infection (Table 3).

Overall seroprevalences for the infections analyzed are summarized in Table 2. Among the 22 HIV-positive subjects, 14 (63.6%) were not aware of their HIV status before the study.

The univariate analysis with HIV infection as the independent variable is summarized in Table 3.

The variables “number of sexual partners in lifetime”, “number of sex worker partners” and “HCV” were significantly associated with HIV infection in the bivariate analysis. Table 4 shows the final logistic regression analysis including the variables that were significantly associated with HIV infection in the bivariate analysis as well as age and gender, as in Table 3.

Only the variables “number of sexual partners in lifetime” and “HCV” remained significantly associated with HIV infection.

**DISCUSSION**


The group here studied was characterized by a predominance of males with low educational and economic levels, subjected to parental and sexual exposures to HIV infection and other STIs. Fifty percent of the subjects reported having had more than 10 sexual partners in lifetime (with 25% reporting more than 20 partners) and 10% reported intravenous drug use, though this is an illicit practice in Brazil.

Seroprevalences of HIV (8.9%), HCV (12.4%), HBV (34.4%) and syphilis (18.4%) were approximately 10 to 12 times higher than the national average (Fonseca et al2002, Fonseca et al2003, Ministério da Saúde2005, Szwarcwald et al2000). Projecting these figures to an estimated 500,000 waste collectors nationwide, there would be approximately 45,000 HIV-positive individuals, of which about 28,000 would not be aware of their HIV status. However, it should be taken into consideration significant regional heterogeneities in HIV seroprevalences, which limit the validity of these projections. The study seroprevalence findings could constitute an increase of around 10% in the cohort of HIV-positive individuals followed by the Brazilian

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**Table 1.** Distribution of the number of sexual partners in lifetime according to HIV status* among recyclable waste collectors. Santos, Southeastern Brazil, 2005.

<table>
<thead>
<tr>
<th>Number of sexual partners in lifetime</th>
<th>HIV status</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Negative (%)</td>
<td>Positive (%)</td>
</tr>
<tr>
<td>0–3</td>
<td>53 (24.8)</td>
<td>4 (7.0)</td>
</tr>
<tr>
<td>4–8</td>
<td>45 (21.1)</td>
<td>6 (11.8)</td>
</tr>
<tr>
<td>9–20</td>
<td>53 (24.8)</td>
<td>2 (3.6)</td>
</tr>
<tr>
<td>&gt;20</td>
<td>42 (19.6)</td>
<td>9 (17.6)</td>
</tr>
<tr>
<td>Total</td>
<td>193 (90.2)</td>
<td>21 (8.9)</td>
</tr>
</tbody>
</table>

* Of 37 subjects who did not report the number of sexual partners in their lifetime, only one was HIV-positive  
Chi-square trend = 6.63 p = 0.085

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**Table 2.** Seroprevalence of the infections analyzed among recyclable waste collectors. Santos, Southeastern Brazil, 2005.

<table>
<thead>
<tr>
<th>Infection</th>
<th>N</th>
<th>Seroprevalence</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIV</td>
<td>251</td>
<td>8.9%</td>
<td>5.39;12.41</td>
</tr>
<tr>
<td>HBC</td>
<td>250</td>
<td>34.4%</td>
<td>28.55;40.25</td>
</tr>
<tr>
<td>HCV</td>
<td>250</td>
<td>12.4%</td>
<td>8.34;16.46</td>
</tr>
<tr>
<td>Syphilis</td>
<td>250</td>
<td>18.4%</td>
<td>13.63;23.17</td>
</tr>
</tbody>
</table>
In addition, if 43% of HIV-positive subjects studied (Table 1) reported more than 20 sexual partners in lifetime, this would mean about 12,000 HIV-positive and very promiscuous (more than 5 sexual partners) individuals spreading the infection to their communities. Moreover, the fact that HCV infection was the main risk factor associated to HIV is a strong indicator that this community is heavily involved with injecting drug use (Burattini et al 2000, Burattini et al 2005, Carvalho et al 1996, Massad et al 1999, Rozman et al 1998), although none of HIV-positive subjects reported IV drug use, which would imply in additional risk to their communities. However, as shown before (Burattini et al 2000, Burattini et al 2005, Massad et al 1999, Rozman et al 1998) low report of intravenous drug use could be expected and HCV status is a good surrogate of this use.

The study sample size allowed to make the above estimates with a relative precision (Lwanga & Lemeshow 1991) of approximately 65%, which reinforces the need of the National Program on HIV/AIDS to dedicate special attention to this particular community regarding their potential role as an underestimate source for spreading the risk of infection.

In conclusion, it should be stressed out that socially vulnerable communities as the one here described are relatively common in middle-income/developing countries. These communities have systematically shown high prevalences of HIV and related infections (Burattini et al 2000, Carvalho et al 1996, Gonçalves et al 2003, Gonçalves et al 2003, Rozman et al 1998, Rozman et al 1997, Segurado et al 1995, Strazzu et al 2004, Zanetta et al 1999). They are marginalized communities with virtually no voice and are generally overlooked by national public health policies and programs as potentially high-risk populations. Therefore, similar seroprevalence studies addressing unassisted communities are still a relevant instrument for social change.
REFERENCES


