Drinking and driving in southeastern Brazil: Results from a roadside survey study

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HIGHLIGHTS
► A roadside survey study on drinking and driving and alcohol consumption in Brazil.
► The breathalyzer test was positive for 24.6% of the drivers.
► Drinking weekly is an increased risk of positive breathalyzer.
► The data show that drinking and driving is relatively common in Brazil.

ABSTRACT

Objective: The objective of this study is to present data from a roadside survey study on drinking and driving and alcohol consumption in southeastern Brazil.

Methods: A cross-sectional roadside survey study using a questionnaire and breathalyzer data is the method used to determine the prevalence of drinking and driving and to examine whether socio-demographic characteristics and drivers’ behavior, attitude and alcohol consumption predicted positive blood alcohol content (BAC). The data were gathered from 2005 to 2007 through roadside surveys conducted on high volume public roads in four cities in southeastern Brazil. A total of 4182 randomly selected drivers took part in the research. Of these drivers, 3488 (83.4%) completed the questionnaire and agreed to take a breath test.

Results: Overall, 24.6% of drivers had a detectable blood alcohol concentration (BAC) and 15.9% had a BAC above the legal limit (0.6 g/l) at the time of the study. Logistic regression controlling for locale (city), sex, age and marital status was used to predict whether each driver would present a positive breath test. Socio-demographic characteristics, driving behaviors and attitudes, and alcohol consumption patterns were included as predictors. These analyses indicated that those who believed drinking and driving was a serious offense were about two-thirds as likely to have a positive breath test, and that drivers reporting a pattern of regular alcohol use were three times as likely to have a positive breath test.

Conclusions: These findings indicate that drinking and driving is relatively common in Brazil, and that it occurs considerably more frequently than similar surveys suggest, is the case in other countries.

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1. Introduction

In January of 1998, the adoption of a new National Traffic Code reduced the allowable blood alcohol concentration (BAC) for drivers throughout Brazil from 0.8 to 0.6 g/l. As a result of this legislation, driving under the influence of alcohol (DUI) became an offense subject to fines, license suspension, and possible imprisonment (Ministério das Cidades, 1997). This change attracted considerable media attention and the consequences of DUI became an important topic for magazine and newspaper articles nationally (Noto, Pinsky, & Mastroianni, 2006). In June, 2008 (after this survey was completed) a new traffic law was enacted that reduced the legal limit of BAC from 0.6 g/l to 0.2 g/l (Law 11.705 popularly known as the “Dry Law”). This new law establishes that the driver with BAC above 0.3 g/l is subject to administrative penalties, such as fines, suspension of the license for 12 months and the annotation of 7 points in the file (severe offense). For alcohol concentration of 0.6 g/l, the law also provides for the arrest of the driver who, criminally prosecuted, can be sentenced from six months to three years in prison (Departamento Nacional de Trânsito — "DNT"), Addictive Behaviors 38 (2013) 1442–1447

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DENATRAN, 2008). A survey based on telephone interviews’ data provided by VIGITEL (a monitoring system of Risk Factors and Protection against Chronic Diseases maintained by the Brazilian Ministry of Health) shows that the frequency of adults who drove after drinking an excessive amount of alcoholic beverages dropped from 2.2% to 0.9% in the first two months after the law was enacted, and increased again to 2.8% in 2009 (Moura, Malta, Neto, Penna, & Temporão, 2009).

Despite these changes, enforcement of DUI laws in Brazil remains inconsistent. According to data from the Brazilian Ministry of Health, the number of traffic accidents increased 24% between 2002 and 2010 and 40,610 people died in traffic crashes in Brazil in 2010 (Ministério da Saúde, 2011). These data indicate a very high rate of crashes since there were fewer than 65 million cars in Brazil at that time (Departamento Nacional de Trânsito – DENATRAN, 2010). In comparison, in the U.S., one of the most motorized countries in the world, the number of registered vehicles totaled approximately 250 million in 2010 and the number of casualties in traffic crashes was 32,310 (National Highway Traffic Safety Administration (NHTSA), 2012; Research, Innovative Technology Administration – RITA, 2012).

Until the late 1990s, data about drinking and driving in Brazil were mainly based on a small number of studies conducted in the northeastern part of the country (Nery Filho, Medina, Melcope, & Oliveira, 1997) and from one study of trauma-related deaths in São Paulo (Carlini-Cotrim & Matta Chasin, 2000). Duailibi, Pinsky and Laranjeira (2007) evaluated the prevalence of drinking and driving in Diadema, Brazil using a roadside survey methodology incorporating active and passive alcohol breath testing in 2007. The breathalyzer proved easy to apply and are reliable, without bias, showing similar results in both instruments. Duailibi, Pinsky and Laranjeira (2007), evaluated the prevalence of drinking and driving in Diadema, Brazil using a roadside survey methodology incorporating active and passive alcohol breath testing in 2007. The breathalyzers proved easy to apply and are reliable, without bias, showing similar results in both instruments. Duailibi, Pinsky and Laranjeira (2007), evaluated the prevalence of drinking and driving in Diadema, Brazil using a roadside survey methodology incorporating active and passive alcohol breath testing in 2007. The breathalyzers proved easy to apply and are reliable, without bias, showing similar results in both instruments.

Since 1997, DENATRAN has been responsible for collecting data on traffic crashes and casualties. The number of crashes increased from 26,796 in 1997 to 51,097 in 2009 (DENATRAN, 2010). In comparison, in the U.S., the number of crashes in 2009 was 678,000 (National Highway Traffic Safety Administration (NHTSA), 2012).

2.2. Survey procedures

Each day of the survey, ten trained interviewers were in the field at each site for data collection. Two of these interviewers were specially trained to administer the breath tests and were dedicated exclusively to collecting those data. Vehicles were randomly selected from the flow of traffic; every fifth passing vehicle was stopped by a uniformed police officer and directed into the survey area. We surveyed only drivers of private motor vehicles, including motorcyles. Commercial vehicles (e.g., taxis, busses, and delivery vehicles) were excluded. Once each vehicle was stopped, a traffic officer evaluated traffic safety conditions, as well as the safety of the research team, supervisors, coordinators and support personnel involved in the study. After confirming safety, the traffic officer left the area and an interviewer informed the drivers that they were being stopped as part of a voluntary research project on traffic safety. Drivers were then asked to complete a brief questionnaire and provide a breath test. Those drivers who agreed to participate in the study were asked to sign a consent form and were given an educational brochure on drinking and driving.

2.3. Study sites

Survey sites in each city were selected after consulting with local authorities regarding appropriate locations (e.g., strategic roadways, sufficient traffic, and appropriate areas adjacent to the roadway for the survey). A recent U.S. national roadside survey used a similar approach in identifying appropriate survey sites (Lacey et al., 2009). Data collection occurred as follows: Diadema — Friday and Saturday nights from 10 pm to 3 am and Sunday afternoons (3 pm to 7 pm) between February 2005 and February 2006; Belo Horizonte — Friday and Saturday nights from 10 pm to 3 am during the first two weeks of December 2005 and 2006, respectively; Vitória — Thursday, Friday and Saturday nights from 10 pm to 4 am, from December 2005 to May 2006; and São Paulo — Friday and Saturday nights from 10 pm to 3 am from December 2006 to March 2007.

2.4. Sample

A total of 4767 vehicles/drivers were approached to participate in the study and 4182 drivers (87.7%) completed the questionnaire. Of these participants, 83.4% (3488) agreed to either an active or passive breath test (Table 1). For the active breath test, each driver was asked to sign a consent form and were given an educational brochure on drinking and driving-related crash, reporting excessive alcohol consumption in the last year, and holding an unfavorable opinion about public policies related to drinking and driving.

Considering the need for additional information on DUI in Brazil, this study presents breath test and questionnaire data gathered from randomly selected drivers at roadside surveys in four cities in southeastern Brazil. We document the prevalence of persons driving above the legal limit (0.6 g/l at the time of the study), as well as those driving with a detectable positive blood alcohol concentration (BAC), which would be in violation of Law 11.705/2008 (“Dry Law”). In addition, we analyzed social–economic, attitudinal, and behavioral predictors of a positive BAC.

2. Methods

2.1. Overview

Data were collected in four cities (locale) in southeastern Brazil (Belo Horizonte, Diadema, São Paulo, and Vitória) using a roadside survey methodology modeled after similar surveys undertaken in the United States and Canada (Beirness & Beasley, 2009; Lacey et al., 2009; Voas, Wells, Lestina, Williams, & Greene, 1998). The data were obtained through self-report questionnaires and breath tests. Interviewer observations of driver behavior were also obtained. In each city, a trained health professional organized the survey, implementing standardized methods and procedures according to established protocols.

<table>
<thead>
<tr>
<th>City</th>
<th>Drivers addressed</th>
<th>Agreed to participate in the study by answering the questionnaire N (%)</th>
<th>Agreed to undergo the active and/or passive breathalyzer N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diadema</td>
<td>1000</td>
<td>908 (90.8)</td>
<td>845 (84.5)</td>
</tr>
<tr>
<td>Belo Horizonte</td>
<td>990</td>
<td>913 (92.2)</td>
<td>579 (58.5)</td>
</tr>
<tr>
<td>Vitória</td>
<td>592</td>
<td>490 (82.8)</td>
<td>444 (75.0)</td>
</tr>
<tr>
<td>São Paulo</td>
<td>2185</td>
<td>1871 (85.6)</td>
<td>1620 (74.1)</td>
</tr>
<tr>
<td>Total</td>
<td>4767</td>
<td>4182 (87.7)</td>
<td>3488 (83.4)</td>
</tr>
</tbody>
</table>
Drivers in Diadema and São Paulo were only asked to provide a passive breath test, while those in Belo Horizonte and Vitória were only asked for an active breath test due to the availability of the instruments in these places.

2.5. Survey measures

All drivers who agreed to participate in the study completed an anonymous questionnaire administered by trained interviewers. The questionnaire included items addressing 1) socioeconomic and demographic characteristics (sex, age, marital status, level of education, employment status and income); 2) previous involvement in traffic crashes; 3) opinions regarding traffic infractions, including drinking and driving; 4) patterns of alcohol consumption (daily, weekly, monthly or sporadically; the usual amount and types of beverages consumed); 5) use of beverages on the interview day; 6) knowledge of laws on specific traffic issues; 7) previous drinking and driving behavior; and 8) opinion regarding the use of breath tests for enforcement of drinking and driving laws. Each interviewer also recorded his or her subjective impression of the driver’s condition based on the signs and symptoms of drug or alcohol impairment. Interviewers selected from the following categories: 1) normal (no sign of being under the influence of alcohol or drugs); 2) under the influence of alcohol or other drugs, but not intoxicated (not obviously impaired, but under the influence of some substance, with decreased attention or emotional instability, but still able to complete the interview); or 3) clearly intoxicated (difficulties with speech or concentration, exhibiting dizziness or imbalance, lack of coordination, impaired critical thinking and inability to be interviewed). The type of vehicle (automobile, SUV, motorcycle) was noted, along with the number of passengers and their use of safety belts. The questionnaire took approximately 5 min to complete. Any questions from drivers regarding breath test or survey procedures were addressed by the team coordinator. Finally, each driver was invited to undergo an active or passive breath test with- out police involvement. Interviewers noted each driver’s breath test results on the corresponding questionnaire, maintaining driver’s anonymity.

2.6. Safety procedures

A number of safety measures were implemented for drivers who agreed to take the breath test and who subsequently presented a BAC level equal to or above the limit established by law, or who were identified by interviewers as being clearly intoxicated and unable to drive. City and state government officials made professional drivers available to take these individuals home. Drinking drivers who refused such assistance were asked to exchange positions with a passenger or to remain at the survey location until they were hydrated and fed. They were allowed to leave once it was safe for them to drive. In these cases, the breath test was repeated until intoxicated drivers presented legal BAC levels (≤0.6 g/l). Alternatively, intoxicated drivers were asked to telephone a friend or acquaintance who was legally and physically fit to come to the survey location and pick them up. This research was carried out in accordance with Helsinki Declaration standards and approved by UNIFESP/EPM research ethics (Committee no. 1409/05).

2.7. Statistical analyses

Initial descriptive analyses were performed to determine the respondents’ socio-demographic characteristics, driving behaviors, attitudes, and alcohol consumption (Tables 2 and 3). Logistic regression was used to investigate the relationship between each positive breath test [computed using a dichotomized measure (BAC: 0 ≤0.2 g/l and 1 > 0.2 g/l)] and the corresponding driver’s socio-demographic characteristics, driving behavior, attitudes, and alcohol consumption. For the purposes of these analyses, drinking and driving attitude was dichotomized (1 = respondent rated drinking and driving as the most serious traffic infraction) as was drinking pattern (1 = at least weekly alcohol consumption). Due to the relatively large number of predictors, the analyses were carried out in three steps. First, we checked the tolerances of all predictor variables. Only variables that yielded tolerances of <0.05 were retained in the model. Second, based on statistical significance of the bivariate tests, potential confounding factors (city, sex, age and marital status) were considered as controls. Third, non-significant predictors were dropped from the analysis.

3. Results

3.1. Socio demographic characteristics

Table 2 shows the socio-demographic characteristics of the sample. Overall, there were four males for every female (4:1) in the sample. Over half of interviewees were single; 30 years of age or younger; had completed some higher education; had a formal job; and had an income over eight times the established monthly minimum wage.

3.2. Driving and drinking behaviors

Table 3 shows the driving and drinking behaviors of the respondents. More than one-third of the sample said that they had previously been involved in a traffic crash. The same percentage reported that they drank on a weekly or daily basis. The most commonly consumed alcoholic beverages were beer, wine, champagne, whiskey, vodka, cognac (cachaça), sugarcane liquor (cachaça), and mixed alcoholic drinks. Participants reported drinking relatively large quantities when they consumed alcohol. Average consumption was reported as follows: beer (4 drinks), wine (5 drinks), other distilled spirits (4.5 drinks), sugarcane liquor (7 drinks), and mixed drinks (2.5 drinks). A substantial proportion of respondents reported...
having driven after drinking at some point in the past (36.3%). Many of the drivers indicated that on at least one occasion, they had asked others to drive their car for them after drinking (40.9%) or that they had planned to take a taxi or a bus or get a ride home (20.9%). None of the others to drive their car for them after drinking (40.9%) or that they of the drivers indicated that on at least one occasion, they had asked

### 3.3. Breath test results

Results of the breath tests in the four cities/locale showed that 15.0% of drivers presented with a blood alcohol concentration (BAC) above the legal limit at the time of the study (>0.6 g/l) (Ministério das Cidades, 1997) and 8.7% showed a blood alcohol level between 0.3 and 0.6 g/l. That is, 24.6% of drivers had a detectable BAC. Under current law in Brazil, all of these drivers would be driving illegally (Departamento Nacional de Trânsito — DENATRAN, 2008). In contrast, although interviewers were trained to observe signs of drinking and intoxication, they identified substantially fewer (14.9%) of the drivers as having consumed any alcohol or drugs.

### 3.4. Predictors of positive BACs

Table 4 shows the final model from the logistic regression. These analyses indicated that: 1) those who believed drinking and driving

<table>
<thead>
<tr>
<th>Predictor</th>
<th>ORb crude (95% CI)</th>
<th>p &lt; 0.05</th>
<th>Adjusted ORb (95% CI)</th>
<th>P &lt; 0.05</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>Female</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>1.170</td>
<td>0.176</td>
<td>1.168</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Up to 30 years old</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>31 years old or more</td>
<td>1291</td>
<td>0.012</td>
<td>1.283</td>
</tr>
<tr>
<td>Marital status</td>
<td>Others</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>0.785</td>
<td>0.019</td>
<td>0.781</td>
</tr>
<tr>
<td>Pattern consumption</td>
<td>No consumption</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>At least weekly</td>
<td>3425</td>
<td>0.000</td>
<td>3.466</td>
</tr>
<tr>
<td>Traffic infractions</td>
<td>Run red light</td>
<td>1.170</td>
<td>0.017</td>
<td>1.283</td>
</tr>
<tr>
<td></td>
<td>Over speed limit</td>
<td>488 (11.8)</td>
<td>10.8, 12.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drive drunk</td>
<td>2809 (67.9)</td>
<td>66.5, 69.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No use of safety equipment</td>
<td>68 (1.6)</td>
<td>1.2, 2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dangerous passing</td>
<td>170 (4.1)</td>
<td>3.5, 4.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pullover on the shoulder of highway</td>
<td>19 (0.5)</td>
<td>0.3, 0.7</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Poorly kept vehicle</td>
<td>67 (1.6)</td>
<td>1.2, 2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>108 (2.6)</td>
<td>1.19, 1.4</td>
<td></td>
</tr>
<tr>
<td>Driving after drinking</td>
<td>Drive after coffee</td>
<td>161 (4.5)</td>
<td>3.9, 5.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alcohol drinking and driving is not a problem</td>
<td>314 (8.9)</td>
<td>8.0, 9.8</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drive more than once</td>
<td>56 (1.6)</td>
<td>1.2, 2.0</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does not drive (take taxi/bus/ride)</td>
<td>739 (20.9)</td>
<td>19.7, 22.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asks another driver to drive</td>
<td>1448 (40.9)</td>
<td>39.4, 42.4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drinks slowly</td>
<td>183 (5.2)</td>
<td>4.5, 5.9</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does not drink (no or two days a week)</td>
<td>572 (16.1)</td>
<td>15.0, 17.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other</td>
<td>71 (2.0)</td>
<td>1.6, 2.4</td>
<td></td>
</tr>
<tr>
<td>Attitude toward breath test</td>
<td>Favorable</td>
<td>3809 (91.8)</td>
<td>91.0, 92.6</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unfavorable</td>
<td>339 (8.2)</td>
<td>7.4, 9.0</td>
<td></td>
</tr>
<tr>
<td>Interviewer evaluation</td>
<td>Normal</td>
<td>3466 (85.1)</td>
<td>84.0, 86.2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Under the influence of alcohol but not drunk</td>
<td>415 (10.2)</td>
<td>9.3, 11.1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Drunk</td>
<td>191 (4.7)</td>
<td>4.1, 5.3</td>
<td></td>
</tr>
</tbody>
</table>

is a serious offense were about two-thirds as likely to have a positive breath test (OR = 0.64; 95% CI = 0.54–0.76); and 2) for regular alcohol consumers, the likelihood of a positive breath test was over three times higher (OR = 3.47; 95% CI = 2.90–4.15).

### 4. Discussion

The present study using roadside surveys with objective measures of blood alcohol levels is one of the first such studies in Brazil or, with few exceptions (e.g., Ingsathit et al., 2009; Mock, Asiamah, & Amegashie, 2001; Odero, 1996), from anywhere in the developing world. The findings have significant implications for traffic safety, as nearly one quarter (24.6%) of drivers surveyed had detectable BACs and 15.0% had BAC levels >0.6 g/l (the legal limit in Brazil when this study took place) and according to the new traffic law (Law 11.705/2008 — “Dry Law”), drinker drivers could be criminally prosecuted with sentence ranging from 6 months to three years in prison. Although such studies are rare in Brazil, research from elsewhere in the world has shown that crash risk increases significantly with even low levels of drinking (Babor et al., 2010). For instance, studies by Ross (1992) and Zador (1991) show that an adult driver with a blood alcohol concentration between 0.5 and 0.9 g/l (within legal limit in many countries) has as much as a 9-fold increased risk of being in a fatal car crash, compared with a driver who has not been drinking. Additionally, as the level of alcohol in the blood increases from 0 to 0.2 g/l the risk of involvement in a fatal crash risk nearly doubles (Ross, 1992; Zador, 1991). The data from this study show that a substantial number of drivers on Brazilian roadways put themselves and others at risk for death and injury through risky drinking and driving behavior.

In this study, about one-third of the drivers reported previously being involved in a car crash, and a substantial proportion reported that they had been drinking on the day of the study. On average, the drivers in the study reported consuming alcoholic beverages on one or two days a week and averaged 4–7 drinks per drinking occasion. Survey data show that the abstention rate is high in Brazil, but about 40% of the population between 18 and 34 years of age engages in binge or heavy episodic drinking (Laranjeira, Pinsky, Sanches, Zaleski,
This pattern of drinking may be one factor underlying the high rates of drinking and driving observed in the current study.

At the same time, the results of this study showed that in general, respondents considered drinking and driving to be a serious traffic offense. Moreover, those who indicated that drinking and driving was the most serious offense were about two-thirds as likely to have a positive breath test. In contrast, the likelihood of having a positive breath test was over three times greater for those with a pattern of regular alcohol consumption. As mentioned above, a recent National Household Alcohol Survey in Brazil found that males who were previously involved in an alcohol-related traffic crash, who reported excessive alcohol consumption in the last year, and who had an unfavorable opinion about public policies, were also more likely to report drinking and driving (Pechansky et al., 2009). Our results are consistent with these household survey findings.

A combination of ineffective laws for regulating the alcohol market, low alcohol prices, and easy availability of alcohol may further account for the high consumption per capita by drinkers in Brazil as compared to the world average (Caetano & Laranjeira, 2006; Pinsky, Labouvie, & Laranjeira, 2004). These factors may also contribute to the overall high rates of drinking and driving and violence. In fact, industry data from Brazil indicate that there are at least 1 million points of sale for beer in the country, or approximately one outlet for every 170 inhabitants (Seligman, 2005). In addition, there are few venues for relaxing and spending social time in poorer communities, which may contribute to bars becoming places to socialize for young people (Peek-Asa, 1999).

Research in other countries has shown that adoption of such measures drinking and driving and the impact of related policy measures. This research represents an important effort to provide data that will contribute to understanding the phenomenon of drinking and driving in Brazil and in other developing countries. At a minimum, this study has significant implications for understanding the extent of drinking and driving in the southeastern region of Brazil and suggests directions that might be explored to reduce this behavior (see below). Importantly, our findings indicate that the population is open to change, since 70% of drivers in this study agreed that drunk driving puts others at risk, and 90% favored the use of breath testing as a preventive measure. In particular, the study suggests that: (1) more effective enforcement measures should be implemented for detecting drinking drivers, including the use of breath testing, sobriety checkpoints, and DUI patrols; (2) public information interventions should be designed to increase trust in the laws and perceptions that enforcement levels are sufficiently high to produce a deterrent effect; and (3) closer regulation and control over the availability of alcoholic beverages should be addressed by policy makers.

Finally, the high rates of drinking and driving found in this study, compared with those found in developed countries (e.g., Beirness & Beasley, 2009; Lacey et al., 2009) point to the urgent need for additional studies of drinking and driving in developing and motorizing countries (Babor et al., 2010). The data presented in this paper suggest that drinking and driving may be a particularly complex problem in the developing world and will require additional attention.

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Contributors
• Valdir Ribeiro Campos — has taken part in literature revision, planning and coordination of data collecting and analysis in Belo Horizonte as well as data analysis in the four cities, data discussion, organization and this article final writing.
• Rebeca Souza e Silva — has taken part in data statistic analysis in the four cities, data discussion.
Sérgio Duailibi — data collecting, analysis planning and coordination in São Paulo, data discussion.

Ronald Laranjeira — has taken part in research planning in the four cities, final writing and revision.

Ester Miyuki Nakamura Palácios — has taken part in data collecting and analysis in Vitória.

Joel W. Grube — has taken part in revision, translation into English and the final writing.

Ilanã Pinsky — has taken part in literature revision, data analysis and discussion in the four cities as well as in the final writing.

Conflict of interest
No conflict declared.

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