



Economic impact of psychoactive substance – related traffic accidents

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Introduction

The purpose of this pioneering study in Brazil is to examine one of the aspects of the negative impacts caused by consumption and access to psychoactive substances: the economic cost of alcohol consumption-related traffic accidents in the city of Porto Alegre. Another specific purpose is to develop a method to measure costs and a database that will allow better understanding of the socioeconomic impact of alcohol consumption.

Quality of health of a population is essential when discussing economic and social development. According to the definition of the United Nation Millenium Development Goals, a global development program instituted by the United Nations Organization (UNO) involving 191 countries, health is a priority concern.

In this sense, the fight against poverty cannot ignore aspects involving consumption, production and access to psychoactive substances (PAS) due to the profound impact this “industry” has on the health of citizens and, consequently, on the socio-economic performance of countries. It is now clearly understood that PAS consumption has an economic impact that goes far beyond its effect on the individual consumer’s health, extending to an increased crime rate, to unsafe sexual practices and syndromes that can cause fetal damage, among other aspects. These negative effects are among the main risk and poverty factors for the economies of emerging and/or developing countries.

Outstanding among these effects is the relationship between the use of PAS and the occurrence of traffic accidents. There is plenty of literature showing that the intake of any amount of alcoholic beverages and other PAS causes cognitive alterations that hinder performance when driving, increasing the risk of traffic accidents (Moskovitz, 1985; Hingson, 2003a).

PAS-related traffic accidents burden society as a whole with a number of economic and social costs. It is an indirect negative impact of the use of PAS that, according to international estimates for New Zealand, can represent up to 4 billion dollars a year due to costs generated by traffic accidents exclusively related to alcohol abuse (Devlin, Scuffham & Bunt, 1997). In Brazil it is estimated that the annual cost of traffic accidents in large cities is R\$ 5.3 billion,

(IPEA/ANTP, 2003) – approximately 0.4% of the country’s GDP.

Access, production and consumption of PAS are amongst the main obstacles to the full and effective development of nations. Therefore sustainable development with social inclusion and equity is only achievable if opinion-setters and decision makers both in the public and private sphere, as well as the community as a whole, gain a real understanding of the impact of drugs on the socioeconomic development of a country (Singer, M. 2008).

In this context, the need to gain deeper knowledge on the costs generated by PAS use in Brazil must be stressed. The present study is one more step towards this. Although traffic accidents are the second cause of death amongst the young, and international data show the economic impact of such accidents and their relation to PAS use, there is still little data on the socioeconomic cost of driving under the influence of psychoactive substances in Brazil. These costs appear in various ways: cost of first aid and hospitalization of victims, loss of productivity, premature death of a significant portion of the economically active population and distressed families. This study has sought to measure all the costs due to traffic accidents related to alcohol abuse in the city of Porto Alegre, through the development of a method based on national and international studies.

In this chapter we will first provide a brief overview of Brazilian reality and the city of Porto Alegre as far as traffic accidents are concerned. Then we will present the main national and international studies that measure the socioeconomic cost of traffic accidents. Finally and based on the previous sections, the types of costs covered by this study will be presented, as well as the method used to measure them.

1. Traffic accidents: a worrying reality

The World Health Organization (WHO) estimates that the number of deaths due to traffic accidents should reach over one million persons in 2015 and recognizes that one of the main causes of these accidents is the consumption of PAS.

In Brazil, violent death is the second main cause of death among the population (Scalassara et. al., 1998). According to Minayo (2009), traffic accidents and homicides are the main

causes of violent death in Brazil. In the 1990s Brazil had 310 thousand traffic accident related deaths (accidents without fatalities were excluded).

In this context traffic accident related-public policies play an essential role in the management of public resources and therefore in the economic effectiveness of the country. However these numbers are only the visible part of the social costs involved. It is now known that the excess violence of urban and road traffic can be a direct consequence of PAS access and that this may be at the root of serious social questions that compromise the country's economic development.

Traffic accidents involve various factors, including: bad vehicle and road maintenance, psychoactive substance consumption and human failure. Both the causes and intensity of fatal accidents vary considerably from one Brazilian municipality to the other (Minayo, 2009). The mortality coefficient determined in the Brazilian city of Maringá for 1992 was 34.6 deaths per 100 thousand inhabitants (Scalassara et. al., 1998). In Londrina, another Brazilian city the coefficient was somewhat lower, 29 deaths/100 thousand inhabitants (Andrade e Mello-Jorge 2000). On the other hand, in São Paulo, where a higher mortality coefficient could be expected, since it is a large urban agglomeration the coefficient in the same year was 21/100 thousand inhabitants (CET 1997).

In another study, Scalassara et. al. (1998) draw a profile of the fatal victims of traffic accidents. The results show that most victims lived in urban areas and were male, in the age group from 20 to 49 years – despite the risk of death being higher for people above 65 years. Pedestrians were the main type of victim (29.2%), followed by motorcyclists (27.7%) and bicyclists (18.5%). Most of the accidents were people being run over (30%) – especially people above the age of 65 – followed by collisions between motor vehicles (26.2%) – especially for people between the ages of 20 and 49, and took place in the urban perimeter. (83.1%), on avenues with

heavy vehicle flow, on weekends, in the afternoon and at night.

Hingson and Winter (2003) show a profile of alcohol-related traffic accident victims similar to that found by Scalassara et. al. (1998). The main victim characteristics are: male drivers, white, aged between 22 and 45, people with alcohol problems and non-users of safety belts. Another result of the study is that traffic accidents are more prone to cause death if alcohol is present. In 2002 the percentage of traffic accidents with alcohol-related deaths was 4%. Besides, most accidents happen at night and on weekends.

In the last few years traffic accidents have increased in number in Brazil: from 1998 to 2005 the number increased by 46.1%, while the population and number of cars increased 16.8% and 36% - the proportion of non-fatal victims per 10,000 vehicles grew 17.7% in the same period (Table 1).

DATASUS (a database from the Brazilian Unified Health System) data also show that the number of TA related deaths increased in Brazil in the last few years, affecting especially the young population. According to DENATRAN (National Transportation Dept) (2005), 27% of the fatal victims of traffic accidents in Brazil were between 18 and 29 years old and 78.6% of these were male. According to Galduróz & Caetano (2004), reporting data from the study by the Associação Brasileira de Departamentos de Trânsito (Brazilian Association of Traffic Departments), in four Brazilian cities (Brasília, Curitiba, Recife e Salvador), in 1997, 27.2% of the traffic accident victims showed blood alcohol levels above the legal 0.6 g/l.

The city of Porto Alegre showed an increase of about 10% in traffic accidents involving victims, (fatal and non-fatal) between 2000-2006, totaling 5499 events in 2006. This growth trend, as well as the number of accidents with victims in the last seven years is also found in the number of non-fatal victims where the trend is even stronger, with an increase of 22% in the period.

Table 1 – Evolution of Traffic Accidents – Brazil – 1998 to 2005 – Source: Detrans/ SINET - DENATRAN-CGIE

	1998	1999	2000	2001	2002	2003	2004	2005
Accidents with Victims	262,374	376,589	286,994	307,287	251,876	333,689	348,583	383,371
Fatal Victims	20,020	20,178	20,049	20,039	18,877	22,629	25,526	26,409
Non-fatal Victims	320,733	325,729	358,762	374,557	318,313	439,065	474,244	513,510
Fatal Victims/10,000 Inhab,	12.4	13.9	11.8	11.6	12.3	12.8	14.1	14.0
Fatal Victims/10,000 Vehic,	6.5	7.0	6.8	6.3	6.2	6.2	6.5	6.3
Non-fatal Victims/10,000 Vehic,	103.7	111.8	124.1	119.8	104.6	119.8	120.9	122.1
Accidents w/Victims/10,000 Vehic,	84.8	116.5	99.3	96.2	75.1	91.0	88.8	91.1



Another characteristic of the distribution of traffic accidents throughout the year is seasonality, since in January and February when the population leaves town due to vacations there is a considerable reduction in the number of accidents (Figure 1).

According to Rio Grande do Sul Dept of Transportation and Empresa Pública de Transporte e Circulação – EPTC (Porto Alegre Public Transportation Enterprise) data in the period from January/2000 to January/2007 traffic accidents within the city of Porto Alegre caused the deaths, on the average, of 13.3 persons per month. In 2006 there were 156 deaths in traffic accidents (Figure 2).

1.2 Socioeconomic Costs of traffic accidents – international and national experience

Among the various applications of Health Economics is measuring the social and economic costs related to health, as the direct cause of disease, violence, crime, premature death and loss of productivity. Since traffic accidents are a form of violence and are harmful to health its is necessary to understand their causes and their real impact on economic and social welfare. Therefore, traffic accidents deserve attention, not only due to the number of victims they generate, but also due to the social and economic cost to the entire society. Most socioeconomic costs are not easy to determine. This, for instance, is the case of loss of productivity due to accidents that wound or kill victims, medical costs of attending victims and their treatment, damage to public and private property, besides psychological damage. All such costs are difficult to measure but have a real and significant impact on the sustainable development of a country or region.

Figure 1: Number of Traffic Accidents with Total of Victims and Number of Non-Fatal Victims in Traffic Accidents – January/2000 to January/2007 in Porto Alegre – Source: EPTC – Empresa Pública de Transporte and Circulação, Estatísticas (2007).

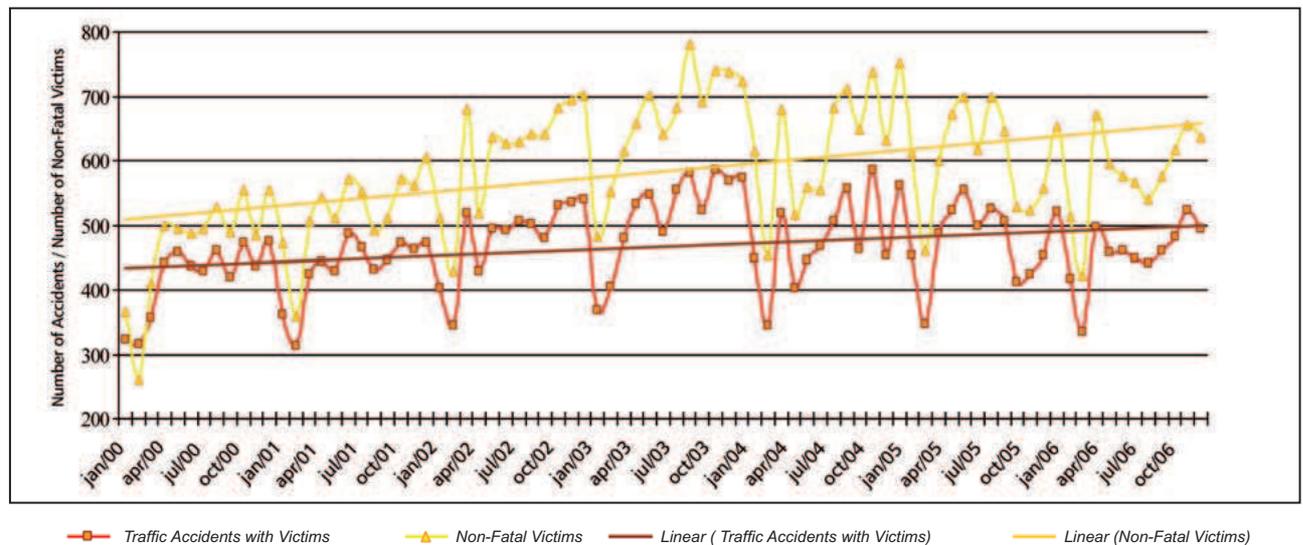
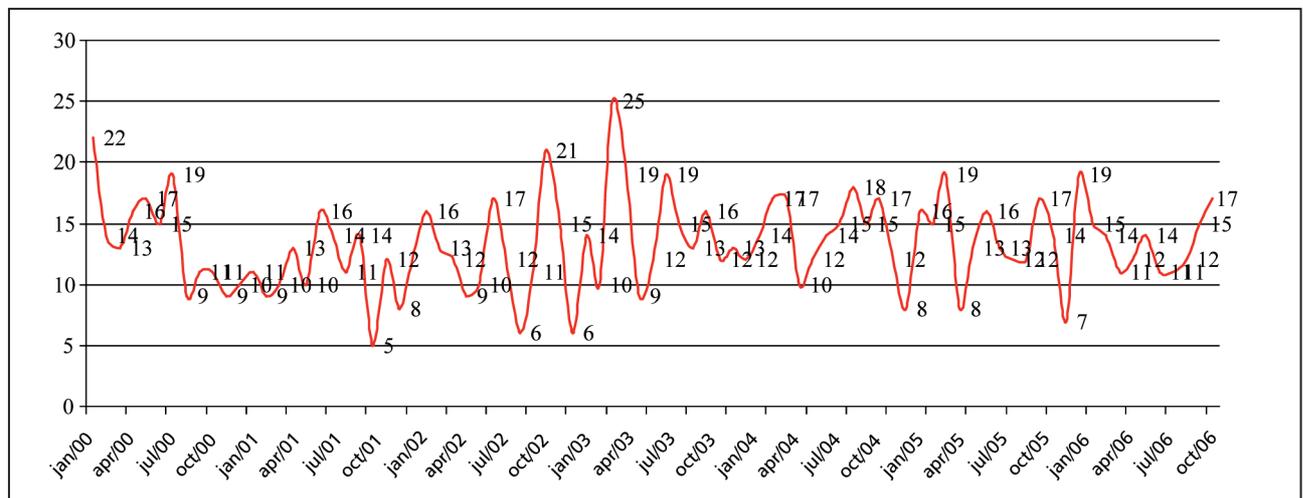


Figure 2: Number of Fatal victims in Traffic Accidents – January/2000 to January/2007 in Porto Alegre. Source: EPTC – Empresa Pública de Transporte and Circulação, Estatísticas (2007).



Several studies record the costs associated with psychoactive substance abuse such as the consumption of alcohol and other illicit, drugs. Most of these studies use the cost of illness methodology, for the purpose not only of recording individual and/or health system costs, but to adopt broader social perspectives that include all the costs and damage caused by illness. Besides economic costs, recent research also estimates intangible costs related to pain, suffering and the impact on the quality of life of those affected by traffic accidents involving PAS.

The cost of illness methodology has often been used over several decades and the estimated costs supply information describing the resources utilized and the potential loss of resources associated with illness. Together with measurements of prevalence, incidence, morbidity and mortality, the estimated costs allow the impact on society of a given disease to be charted.

National and international literature using cost of disease methodology is extensive and well-established. The perception is that for cases of alcohol and psychoactive substance abuse this methodology has been shown to be adequate, even leading to drafting an International Guideline to systematize and improve Economic Cost estimates for Substance abuse (Single; 1995). Several more recent studies use this methodology to obtain direct, indirect and intangible costs linked to diseases caused by the abuse of alcohol or other substances, as to international studies, in 2002 the U.S. Department of Traffic presented a report showing the costs generated by traffic accidents involving motor vehicles in 2000. The results show an economic cost of 230.6 billion dollars, which represent the economic consequences of 41,821 deaths 5.3 million non-fatal victims and 28 million damaged vehicles.

In the specific case of alcohol abuse, a recent study estimates that in the state of California (USA) in 2005 this abuse generated a total economic cost of 38.5 billion dollars. This cost involves aspects such as medical treatment, loss of productivity and work days, the cost of criminal prosecution, and other costs.

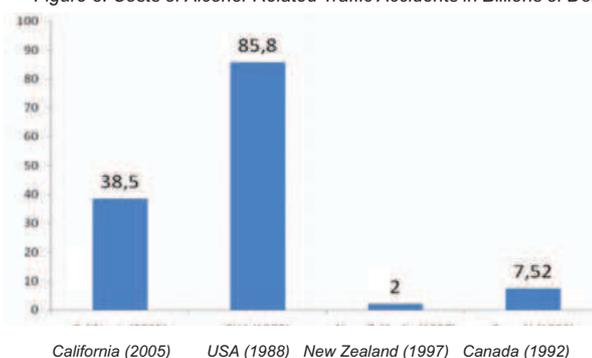
Besides economic costs alcohol abuse is also responsible for significant losses of quality of life: suffering caused by the violence associated with alcohol abuse, loss of years of life due to early death and sequelae of disease or accidents. These comprise the costs due to loss of quality of life, estimated as 48.8 billion dollars for California in 2005.

Rice, Kelman & Miller (1991) estimated the total yearly cost of PAS abuse and mental disease as 273.3 billion dollars in the U.S. in 1988. Of this total cost US\$ 85.8 billion refer to alcohol abuse, \$58.3 billion to the abuse of other drugs and \$129.3 billion refer to mental illness. In New Zealand the yearly cost of alcohol abuse was estimated as between 1 and 4 billion dollars, given a rate of alcohol abuse prevalence of 6.45% for men and 2.15% for women. In order to estimate these costs the authors considered the cost of hospitalization, recovery, absenteeism, excess of unemployment, efficiency reduction, premature death and imprisonment.

Single et. al. (1998) measured the cost of PAS abuse for Canada in 1992, and found a result of more than 18.4 billions dollars, which corresponds to about US\$ 694 per capita and 2.7% of the Canadian GDP. Alcohol costs were as high as US\$ 7.52 billions of which US\$ 4.14 billion were due to loss of productivity, US\$ 1.36 billions in legal costs and US\$ 1.3 billions to direct health costs. Tobacco costs were US\$ 9.56 billions: US\$ 6.82 billions due to loss of productivity and US\$ 2.6 billions in direct health costs. Finally the costs pertaining to other illicit drugs were US\$ 1.4 billions.

Some of these data are presented in Figure 3 (below), which shows the magnitude of the social and economic impact of alcohol consumption on society.

Figure 3: Costs of Alcohol-Related Traffic Accidents in Billions of Dollars



There is lack of data on the cost to Brazilian society of the use of psychoactive substances. The only study – besides this one – that shows the results regarding costs generated by traffic accidents was carried out by IPEA/AN TP (2003).

The results show an annual cost of R\$ 5.3 billions – about 0.4% of the GDP of the country. Of this total 42.8% refers to loss of production linked to the premature death of persons or the temporary interruption of their activities, 13.3% refers to medical costs and 28.8% to the cost of repairing vehicles that have been in accidents.



Notwithstanding, these costs are not independent of the relationship with PAS consumption linked accidents. Therefore the relevance of this study can be perceived, insofar as it is a pioneering effort in Brazil, to estimate the economic and social cost of the consumption of psychoactive substances, especially the costs of traffic accidents in the city of Porto Alegre linked to the use of alcohol. The international research data presented in this section are clear evidence of the magnitude of these costs, and therefore of the potential impact of public policies that seek a reduction in the consumption of psychoactive substances.

This study seeks to identify, measure and determine the value of the costs and consequences associated with drunken individuals who were involved in traffic accidents in the city of Porto Alegre, from a social perspective. Two separate methodologies are used for this: the cost of illness methodology and the contingent value determination methodology. The former is used to obtain the direct and indirect costs associated with alcohol abuse in traffic accidents; the latter is used to obtain intangible costs and the readiness to pay for public policies that seek a reduction in the number of traffic accidents. Table 1 summarizes the main costs measured in this survey.

Direct Costs are goods, services and other resources used to deal with the outcome of traffic accidents. Some of these costs are: rescue, medical and hospital, rehabilitation, police and traffic agent services, damage to public and third party property, cost of damage to the vehicle, social security and legal costs.

Indirect Costs or productivity costs are defined in literature as costs related to the loss or reduction of the capacity to work or engage in leisure activities due to morbidity or death (Drummond & McGuire (2001), Gold et. al. (1996), Kobelt (2002) and Drummond et. al. (2005)). These are important cost components when the purpose is to carry out a cost of illness study. Illness can alter the way an individual allocates time, and considering that time is a limited input and its use is related to the cost of opportunity, any change in its allocation due to a traffic accident must be monetarily quantified and added to the social and economic costs. The questionnaire on this subject is based on methodology developed by Van Roijen et al.(1996) and Reilly et al. (1993).

Finally the Intangible Costs, i.e., costs related to changes in health/quality of life, suffering or pain associated with treatment, or the loss of a loved one, reflect states that cannot be easily measured or have values ascribed to them.

Table 1: Summary of the Main Costs – Source: Drawn up by the authors based on Single (1995) and NBR 6061.

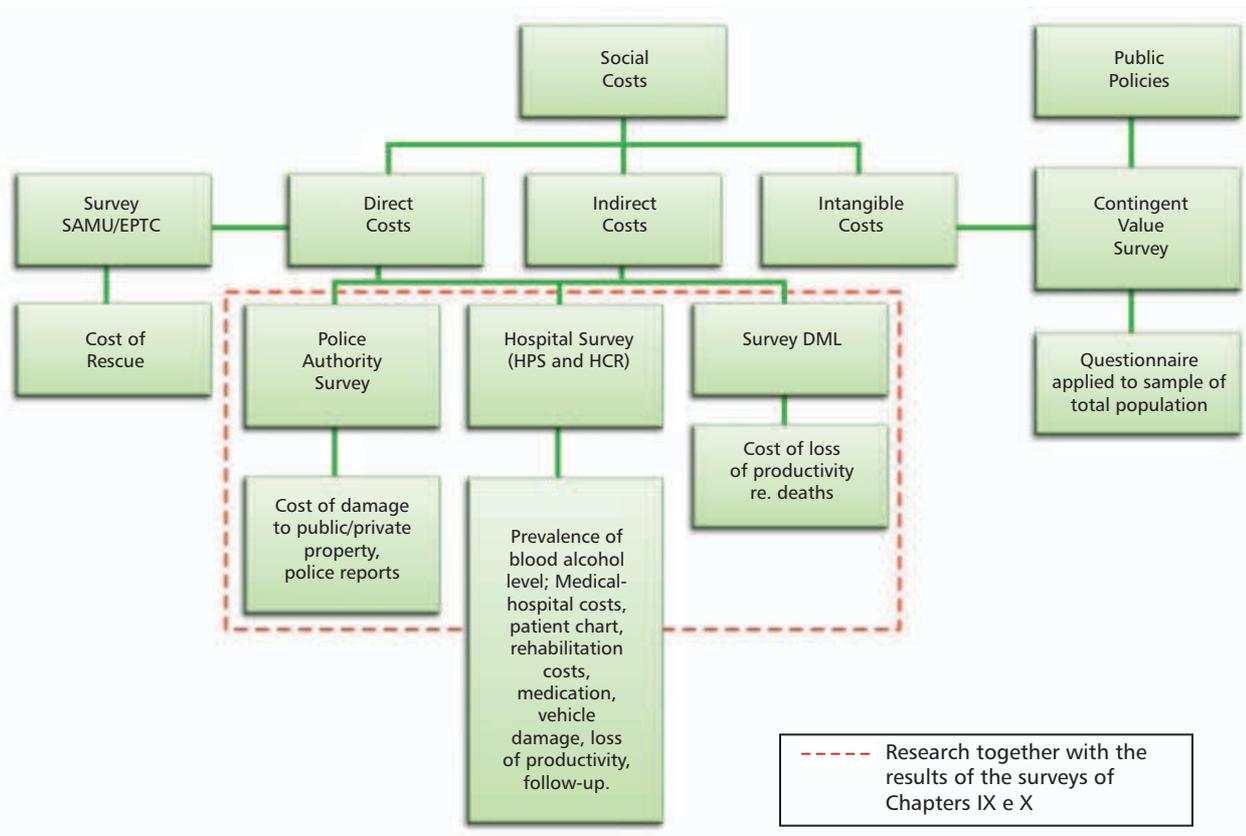
Costs
Direct
- victim rescue
- medical-hospital
- rehabilitation – physiotherapy, etc.;
- outpatient/emergency medication
- damage to vehicles involved;
- damage to public and private property.
Indirect
- loss of work days;
- loss of work days by family members or other;
- not being able to work;
- loss of productivity;
- death.
Intangible
- cost of suffering related to traffic accident.

Notwithstanding, contingent value allocation techniques allow the attribution of monetary values to the possible outcomes. “Declared Preferences of the Disposition to Pay” are used to indicate what individuals would be ready to pay not to undergo the suffering and losses caused by such outcomes (Kowalski & Ferraz, 2005).

The study is structured as illustrated in Figure 4. The direct costs were obtained from three sources: data collected from Empresa Pública de Transporte e Circulação (EPTC), data collected from Police Authorities and data collected at Emergency Room Hospitals (questionnaire applied on site, data collected from Medical Records and phone follow-up of victims). The indirect costs were obtained from two sources: for non-fatal victims by phone follow-up during six months, in the case of fatal victims data collection at the Medico Legal Department. Finally the intangible costs were obtained by phone follow-up. Besides this, a survey was carried out in Porto Alegre to measure the population’s readiness to pay for public policies aimed at preventing traffic accidents.

Sampling was performed at the two hospitals that receive most of the casualties: Hospital de Pronto Socorro de Porto Alegre and Hospital Cristo Redentor. To obtain direct, indirect and intangible costs the recorded victims were followed-up by monthly phone calls – monthly periodicity is suggested to avoid memory (accuracy) problems on the description of costs and morbidities caused by the traffic accident.

Figure 4: Study Flow-Chart



In the case of fatal accident victims, the costs of loss of life were calculated based on a survey at the Medical Examiner's Office (Departamento Médico Legal - DML). A cross-sectional study was carried out with secondary data from the charts completed during the autopsies carried out in cases of Traffic Accidents. These data are available from the database in that Department. Data collected include all fatal victims whose accidents occurred within the urban area of Porto Alegre during one year. This information is in the DML reports, which provide details on the causes of death, such as blood alcohol level or the use of psychotropic substances, among others. Personal characteristics are also collected such as age, sex, color and profession so that it was possible to obtain more precise information to calculate the social and economic costs associated with TA caused by alcohol abuse. The individuals involved in traffic accidents were defined as drivers (of cars and motorcycles), occupants (people being driver and/or passengers in the case of buses) or pedestrians.

A parallel investigation was carried out on the cost, to public and private entities, of rescues and damage to public and private property defrayed by the Empresa Pública de Transporte e Circulação (EPTC) (Public Transport Organization), which is called to all accidents in the urban area of Porto Alegre, The Military Police which is always called in the case of accidents with victims, the Departamento

Estadual de Polícia Judiciária de Trânsito (DETRAN) (State Judiciary Police) which records all the occurrences and SAMU which supplies emergency care and transports the victims to the Emergency Hospitals. Besides, a survey was carried out with the Health Insurers (who send rescue services to their policy holders) and the goods and services underwriters (who insure the vehicles and victims' lives), the cost of rescue and damage and its impact on insurance premiums. The data are secondary since we only sought information which these organizations already have made available.

A cross-sectional study was also carried out in Porto Alegre to analyze the perception of traffic accidents by individuals. A specific questionnaire was developed for this purpose based on the related literature. In this questionnaire the interviewee stated whether he had ever been in a traffic accident or if a relative or close friend had been involved, his perception on the problem of alcohol in traffic accidents and other matters pertaining to alcohol consumption (frequency with which he consumes alcohol, how long he has been consuming it, type of beverage, expenditures on alcoholic beverage).

The interviewee also was questioned as to being in agreement with paying for public policies that would reduce traffic accidents, in which hypothetical scenarios of public policy establishment or not were presented (see Silva &



Lima (2006); Amim & Khondoker (2004); Kowalski & Ferraz (2004); Santana & Mota (2004)).

All these data are obtained based on standard forms and questionnaires according to the appropriate literature. The following instruments are used to collect data: questionnaires applied to accident victims in the Emergency Hospitals, data collection forms to obtain information from the medical

records of accident victims applied by phone during the six months of the follow up of non-fatal victims, data collection forms on the rescue costs at EPTC, data collection form on fatal victims at the Medical Examiner's office (DML) and questionnaire applied in a random sampling of the Porto Alegre inhabitants (contingent value of public policies). The results of the data collected and their analyses can be examined in chapters XIV e XV.

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