MODELING OCCURRENCES OF ACCIDENTS INVOLVING MOTORCYCLISTS

Bruna Oliveira Rosa, The StateUniversityof Montes Claros
Narciso Ferreira dos Santos Neto, The StateUniversityof Montes Claros
Rômulo Dante Orrico Filho, The Federal Universityof Rio de Janeiro

ABSTRACT

It is estimated that 1.3 million of people, each year, die in world as consequence of traffic accidents. The increase in accidents statistics and in traffic mortality is, mainly in emerging countries, the motorcycle. This study characterizes the occurrence traffic accidents with motorcycle, considering their spatial behavior. Besides, diagnose the influential variables these accidents, collating these variables with the security policy apply in actual context.

Based on the retrospective data collected and collating databases of traffic accidents registered by the Military Police, Fire Service and Mobile Emergency Care (SAMU). Over information about the vehicular flow and road characteristics registered in MCTRANS (Municipal Company of Planning Management and Education in Traffic and Transport of Montes Claros).

For formulation accidents causal model is considered relevant: (i) definition of the study period; (ii) database treatment; (iii) accidents mapping; (iv) local analysis; (v) cluster analysis of the accidents profile; (vi) the definition of influential variables; (vii) analysis of influential variables; (viii) collating results with the security policy.

The variables showed significant changes in the accidents rate values. The results show divergent of the security policies adopted in the region. These should fit, since the growing motorcycles fleet is a recent phenomenon and that should continue in the cities.

The identification of factors that contribute to accidents involving motorcycles in urban roads represents a relevant topic. The results can be used in aid decision regarding the implementation of mitigation measures.

INTRODUCTION

Itcan not discuss security without first writing about traffic accidents. According JORGE (1984), "in 1961 the WHO proposed that traffic accidents worldwide were treated as a case of public health, since they represent a social problem of major proportions" (DINIZ; SANTOS, 2007).

The World Health Organization estimates that in 2020 traffic accidents (TA) will be the 2nd cause of premature death in the world (Davantel et al., 2009). In Brazil, they appear a problem of great social and economic impact representing more than a quarter of all violent deaths (WHO, 2004). Of the four responsible for external causes of death, they caused 36.2% of deaths, second only to homicide (49.0%) (SECRETARY OF HEALTH SURVEILLANCE 2004). This makes the traffic in Brazil is considered, according MARIN & QUEIROZ (2000), one of the most dangerous and worst in the world, with rates equivalent to 1 traffic accident for every batch of 410 vehicles while in Sweden the figure is one accident for 21,400 vehicles.

Increased vehicle fleet is a worldwide phenomenon, though neither road system or urban planning have accompanied this growth. And in Brazil, in recent months, the federal government stimulus through tax cuts, only have done so much growing fleet of cars as motorcycles. And one of the consequences of this unplanned growth is the increasing number of accidents, especially for cars and two wheelers.

In 2006, 45.86% (DENATRAN 2007) cars, along with the coaches, were involved in accidents with victims in Brazil. Already motorcycles and scooters accounted for 31.01% of them in the same year, and in 2003 they were involved in 25.59% of accidents with victims. (DENATRAN 2007).

Brazil is the 4th largest market for motorcycles in the world and, in 2009, reached the milestone of approximately 1.6 million units sold. The market expectation for 2013 is to be reached 3 million units (Abraciclo, 2010). This fast growing fleet of motorcycles and use of delivery services through these vehicles, especially in large cities, exacerbating the main problem of traffic: traffic accidents (BRASIL, 2003).

It is known that although motorcycles represent smaller fleet for cars (25%) they contribute the largest number of victims (56%) and therefore capture 47% of the value of claims paid by insurance DPVAT1 (DPVAT, 2012). They are more vulnerable and severity in OT, as the potential for mortality (measured with Brazilian data), is 10 times higher than for cars (BRASIL, 2005).

The study presented by Brasil (2003) showed that vehicles with victims, the motorcycle category showed percentages greater than 60% in Recife, 75% in Porto Alegre and Sao Paulo and 82.4% in Bethlehem in 2001 in Brazil, motorcycles represented a 19% share of the total cost of accidents, even with a fleet of 11%. The costs of traffic accidents revolve around 1% of GDP in developing countries (WHO REPORT 2004 PAGE 2).

Another factor that stands out is how men are most in accidents: 35,661 victims of fatal traffic accidents in Brazil, 81.5% are male, and 22.5% are young people in the age range of 15 age 24 (DENATRAN 2004). Several studies there is a strong connection between aggression and transit, especially among young people and adolescents.

Thus, this study aims to investigate traffic accidents involving motorcycle in the city of Montes Claros in 2011, thereby providing subsidies to formulate specific policies for motorcyclists, given its dominant share in traffic accidents with casualties in the city .To

do this, set up the profile and the profile of the accident victims, finally, there was a spatial analysis using age groups grouped by neighborhoods, providing a profile of the victims.

MOTORCYCLE ACCIDENT

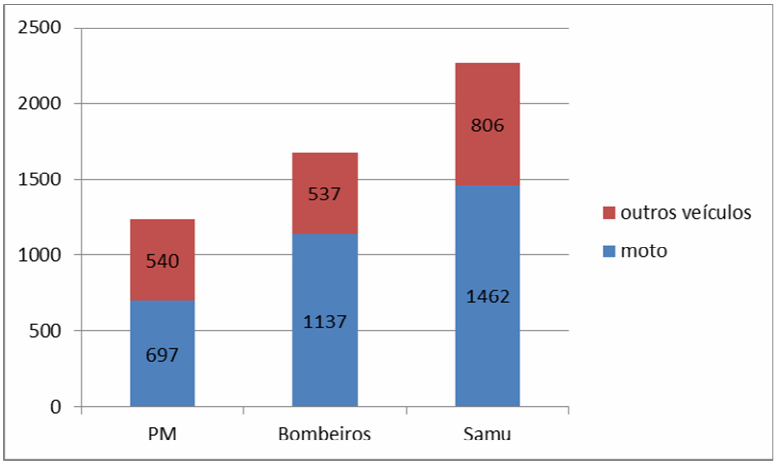
Significant peculiarities inherent to the means of transport motorcycles. An important question relates to the perception of motion of two-wheeled vehicle by other road users, especially at intersections (KIM et al., 2007). The motorcycle accidents usually involve novice drivers, particularly young (HURT et al., 1980). They also cover perceptual deficiencies and lack of attention from other drivers belonging to other vehicles that simply do not detect an approaching motorcycle, violating the rights of passage of the latter (ROWV - Rights of Way Violation). According to the Department for Transport in England (DfT, 2005), the main risk situations faced by motorcyclists are: (i) the loss of control when cornering (losing control bend), (ii) the passing of other vehicles without crossing the boundary line from the center of the lane (overtaking) and (iii) the movement of transposing rows of two vehicles that are statically called traffic filtering (filtering).

DATABASE TREATMENT

The approach of accidents with a view to identifying the contributing factors of casualties is to establish links between the various elements involved: the human profile, the means of transportation, the environment and also the socio-economic factors most comprehensive representative of the mode of live in the present times that have interference in the transport system

In 2011, traffic accidents recorded over 63% are related to the motorcyclist. It is interesting to mention that motorcycles account for about 43% of the fleet registered in the city according to data from DENATRAN (2012), while the state average is 27%. The city of Montes Claros has a fleet of bikes than the fleet of cars, with 68,045 cars and 69,487 motorcycles, scooters and mopeds (DENATRAN, 2012).

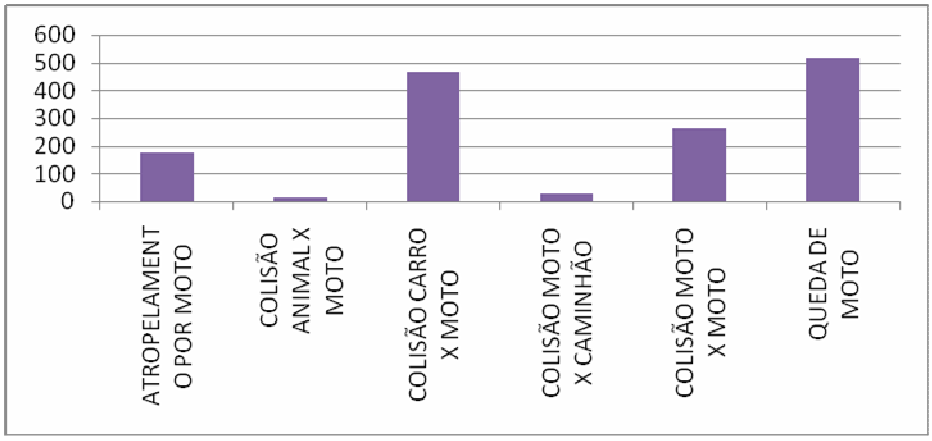
Corroborating the statements of Brazil (2003), Brazil (2005) and George et al. (2008) mention that the vulnerability presented by motorcycles. Note that the motorcycle accidents have an increased number of victims compared to other vehicles.



Graphic 1: Motorcycle accidents in Montes Claros, 2011

Many motorcycle accidents are covered in other scenarios (Dft, 2003). The rear-end collisions (rear end shunt) between two-wheelers and the others are not very uncommon. They happen mainly when the traffic flow is stopped, waiting for the traffic light. In this situation, if the motorcycle is traveling at a speed compatible with the conditions of the route and / or there is sufficient braking distance, there is high probability of an accident.

The data from the city of Montes Claros clearly reveal this situation, the collision between car and bike appears as the second major cause of accidents involving motorcyclists. The most apparent is the fall because braking is a technique for complex and sophisticated two-wheeled vehicle. It seems to be a case of faults associated with inexperience and driver's attitude or behavior inappropriate to the direction (Dft, 2005).



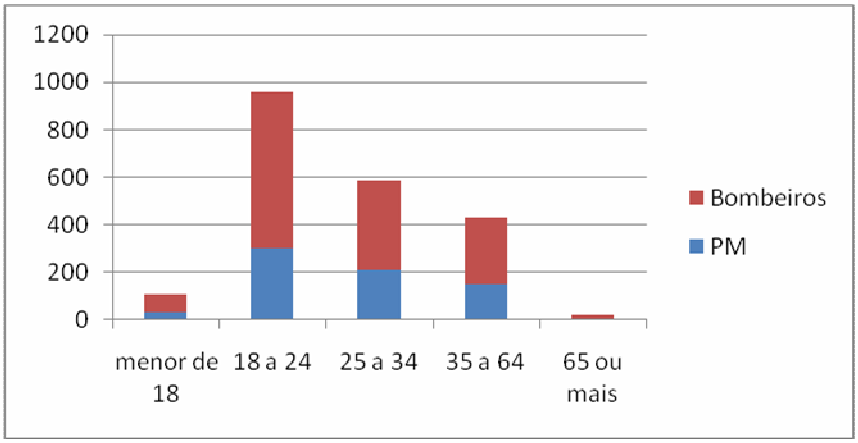
Graphic 2: Motorcycle accidents Types in Montes Claros, 2011

The most important factor in making risk is age (Mc KNIGHT, 2001). Young people are very likely to adopt an aggressive style of direction, reflecting the inexperience in dealing with automotive vehicles, especially motorcycles, non-recognition of hazards and inadequate responses to these situations. Another critical issue relates to the decision-making behind the wheel. The act of driving a vehicle is not easy and it takes a few years of experience to acquire the skills necessary to make good decisions while driving vehicle (HING, 2003). The Brazilian Traffic Code (BRAZIL, 1997) considers this relevant, since it establishes the need for beginner driver fulfill one year of probation

until the final license to drive. In the UK, a license to drive vehicles was completely revamped in the nineties, mainly targeting the training of young motorcycle riders (Dft, 2003)

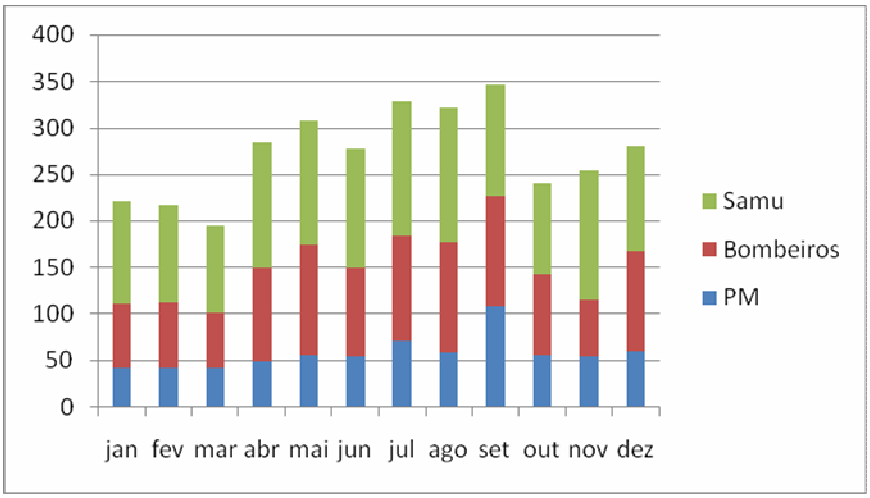
The chart below confirms the situation presented. Of the accidents, mostly focuses on younger drivers. Showing Furthermore, the existence of conductors not enabled (under 18) in driving of the vehicle.

Besides all the aforementioned issues, young people, to drive cars, still suffering the effects of the need for self-assertion before the group of friends. All these factors contribute to accidents and implicitly denote a behavior inherent risk youth



Graphic 3: Age of victims Motorcycle accidents in Montes Claros, 2011

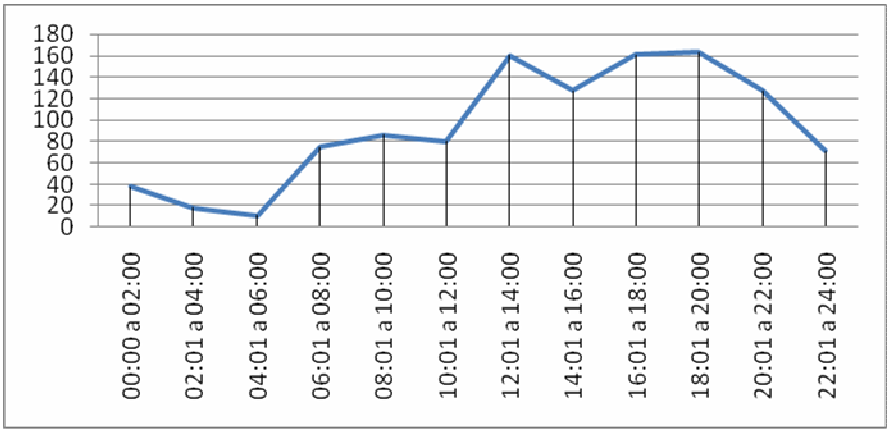
Despite an apparent uniform distribution, the month got more records occurrences with motorcyclists was the month of September and the lowest incidence was in March, according demonstrate graph.



Graphic 4: Period Motorcycle accidents in Montes Claros, 2011

The peak is in the slot between 12:01 and 14:00 and from 16:01 to 20:00, the time slot with fewer accidents is during dawn and the time 04:01 to 06:00 of the smaller occurreces. This indicates that at the times when the traffic flow is more dense, the

time at which people leave the service and return for lunch, and late afternoon, when residences are returning to or leaving for college.



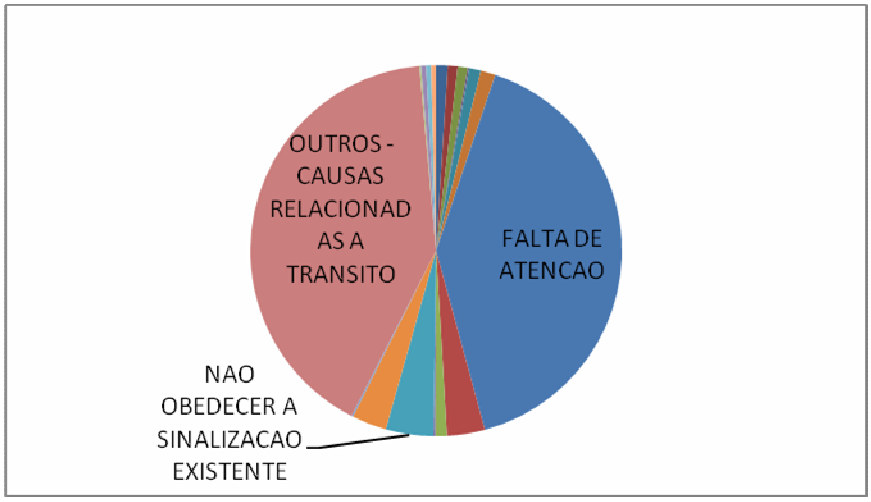
Graphic 5: Timetable Motorcycle accidents in Montes Claros, 2011

There are many contributing factors of accidents that are associated with a risk-taking element (Dft, 2003). Basically this issue deals with human behavior.

Traveling at speeds too high for traffic conditions, stop the vehicle in extreme situations, overtake other vehicles improperly, ignoring the road signs, driving under the influence of alcohol or drugs, driving so disabled, not wear protective equipment (helmet and appropriate clothing), among others, are examples of human attitudes that compromise traffic safety.

The consumption of alcohol is appropriate. Even knowing that this practice causes decreased motor reflexes, many bikers make use of it because it is a drink accepted by social standards. The legislation in many cases, not only obstructs consumption determines the tolerance ranges.

Although the database does not provide much clarity about the cause of the accident, with the factor "other transit-related causes" as predominant in determining the accident, according to the chart below. Another factor also getting attention is the case of "lack of attention", according to Hurt et al (1980) many drivers have a high degree of awareness of the risk of individual decision-making, but do not abdicate.



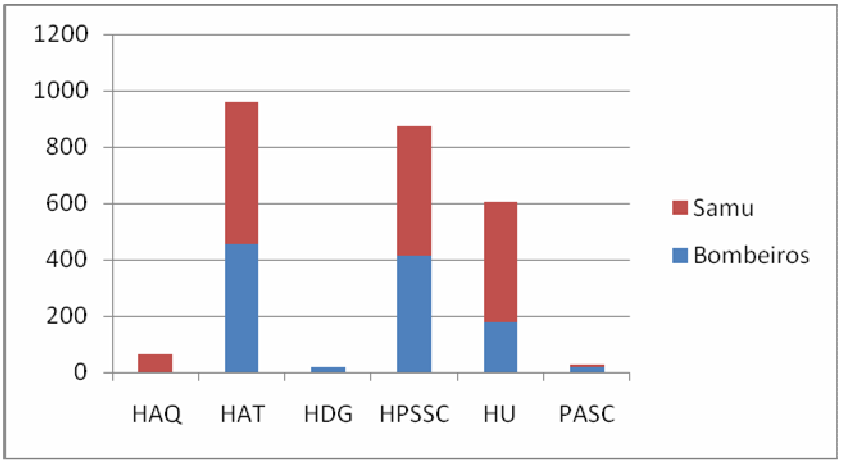
Graphic 6: Causes of the Motorcycle accidents in Montes Claros, 2011

Dalossi (1993) confirms the predominance of young adult males among the victims of traffic accidents, characteristics also found in this study.

Deslandes and Silva (2000) observed a high average daily attendance for the victims of traffic accidents (collisions, pedestrian accidents and other accidents) about 10 calls / day at public hospitals in Rio de Janeiro. Lima (1996) argues that the number of injuries due to traffic accidents is at least 14 times greater than the number of deaths and that among the wounded, about 20% are left with irreversible consequences. Study Rodrigues (1995) on hospital mortality, shows that of all injuries to the skull met in 1990 in RibeirãoPreto, mostly due to traffic accidents. Remember that most of the victims of fatal traffic accidents does not reach the hospitals, dying on site or en route.

Hospitals in the city of Montes Claros that victims receive more traffic by motorcycle is the Hospital AroldoTourinho (HAT) and the Santa Casa (HPSSC). The Hospital Foundation of Montes Claros - AroldoTourinho Hospital - was created on September 28, 1987. Formerly known as Municipal Hospital of Montes Claros, was regulated on October 8, 1987. Defers to his status as "a civil, private-sector and philanthropic nonprofit."

In recent years the Hospital has accelerated its growth, from 1.600m ² of floor space to about 11.500m ². Today the Institution has about 40 clinics and health care service units installed in their premises, with 192 beds and a staff of 613 employees,

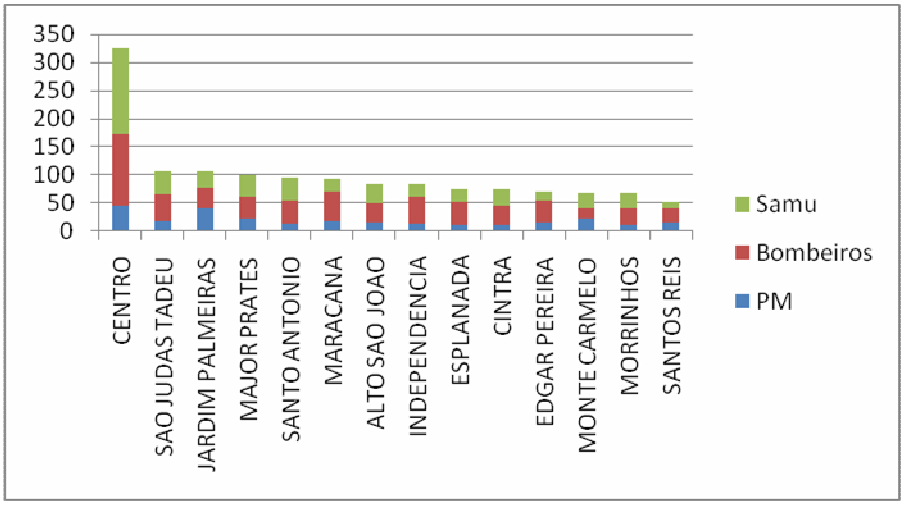


Graphic 7: Hospital forward of the victims Motorcycle accidents in Montes Claros, 2011

The road environment is traditionally cited as one of the most important factors contributing to traffic accidents (Dft, 2004). It can be defined as that set of physical factors external to the vehicle which increase the risks. May be associated with geometric profile of the route by narrowing lanes, shoulders, irregular closed curves, poorly marked intersections, access via the underground. Factors potentially hazardous to traffic outside the track platform (poles, trees, landfill, road signs), but placed in unsafe distance raise the likelihood of accidents. The poor condition of the road, insufficient drainage, presence of fog and rain in the course of travel increases the risk factors for the achievement of claims among others (UN, 1994).

The environment significantly affects the motorcycle safety. Often, the design, construction and maintenance of track are meant for cars and trucks, resulting in different conditions and dangerous to operate the two-wheeled vehicle (BEDNAR et al., 2001). Additional attention should be directed to the problem in order to tailor it needs the vehicle more vulnerable and fragile.

Below graph shows the neighborhoods of the city of Montes Claros, with most accidents occurred during the period. Generally the AT involving motorcycle appear in all districts, the central region has the highest number of accidents recorded, which indicates the inefficiency of the process, in maintaining a safe transit. A study by Sardinha and França (2010), with respect to the infrastructure of central city, highlights the existence of narrow waterways not obeying the measures corresponding to the site and in terrible condition, occurrence of obstacles on the sidewalks preventing the free pedestrian circulation, inadequate signage and poor and lack of parking, among others. Concluding that the central area was not designed to accommodate the large flow of vehicles and pedestrians moving on site.



Graphic 8: Region of occurrence Motorcycle accidents in Montes Claros, 2011

It can identify geographically the points developed across the map. The data used had to be georeferenced, since only the data band of the Military Police had the geographic coordinates of the crash site.

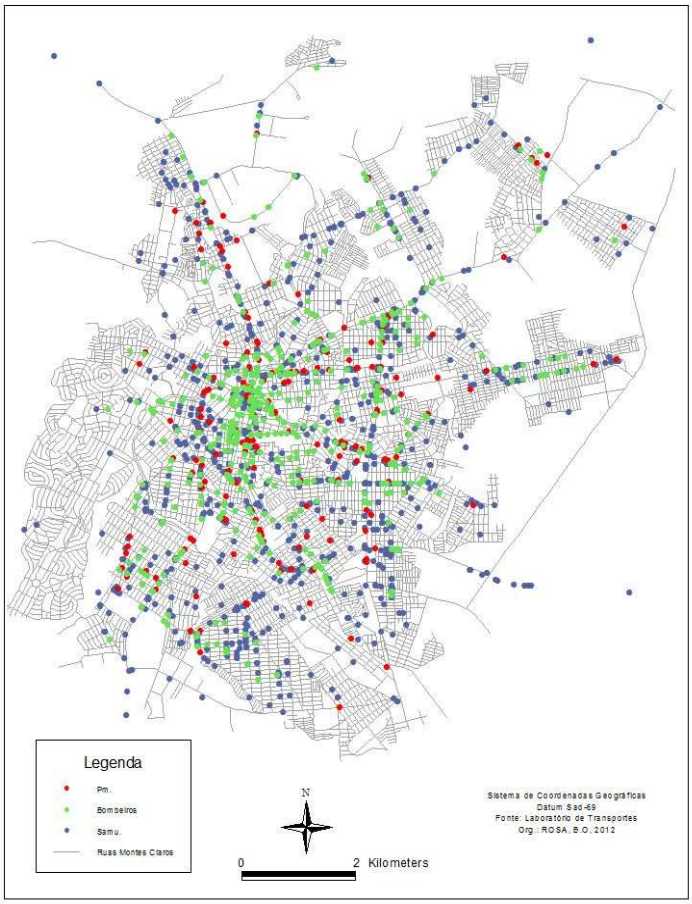


Image 1: Map motorcyclist accidents in Montes Claros, 2011

CONCLUSIONS

By opting for a two-wheeled vehicle as a means of locomotion, a person takes a risk inherent in modal choice (Quddus et al., 2002). In this case, the statistical risk factors of the transport system are being allocated to it as a whole. Even if the motorcycle drivers individually adopt the best concepts of defensive driving, yet there is a high risk environment in transit due to unsafe acts from the other occupants of the track, but also by environmental conditions that are not always conducive to receive vehicles two wheels (Mannering; Grodsky, 1995).

The motorcycles have become more vulnerable in traffic accidents and contribute the greatest number of victims. It was found in this study that accidents involving motorcycles represent 63% of all AT registered in this period. With regard to male and female analyzed that male presents with highest number of accident victims by motorcycle, especially in the age group 18 to 24 years. The central region of greater concentration of accident.

It is suggested for the transit authority the adequacy of the bank as the Fire Department and the Office of Mobile Emergency entering the geographical coordinates of the accident. It can thus be performed further studies on geostatistics and spatial analysis resulting in more accurate data to decision makers.

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