Occupational accidents among mototaxi drivers

Acidentes de trabalho com mototaxistas

Camila Rego Amorim[I]
Edna Maria de Araújo[II]
Tânia Maria de Araújo[III]
Nelson Fernandes de Oliveira[II]

[I] Programa de Pós-Graduação em Saúde Coletiva da Universidade Estadual de Feira de Santana (UEFS)

[II] Núcleo Interdisciplinar de Estudos sobre Desigualdades em Saúde (NUDES) do Programa de Pós-Graduação em Saúde Coletiva da Universidade Estadual de Feira de Santana (UEFS)

[III] Núcleo de Epidemiologia (NEPI) do Programa de Pós-Graduação em Saúde Coletiva da Universidade Estadual de Feira de Santana (UEFS)

Correspondência: Camila Rego Amorim. Universidade Estadual de Feira de Santana-UEFS. Centro de Pós-Graduação em Saúde Coletiva. Núcleo de Epidemiologia. Av. Transnordestina s/n, bairro Novo horizonte. Feira de Santana, BA – CEP 44036-900. E-mail: camilaamorim30@hotmail.com

Abstract

The use of motorcycles as a means of work has contributed to the increase in traffic accidents, in particular, mototaxi accidents. The aim of this study was to estimate and characterize the incidence of occupational accidents among the mototaxis registered in Feira de Santana, BA. This is a cross-sectional study with descriptive and census data. Of the 300 professionals registered at the Municipal Transportation Service, 267 professionals were interviewed through a structured questionnaire. Then, a descriptive analysis was conducted and the incidence of accidents was estimated based on the variables studied. Relative risks were calculated and statistical significance was determined using the chi-square test and Fisher's exact test, considering $p \leq 0.05$. Logistic regression was used in order to perform simultaneous adjustment of variables. Occupational accidents were observed in 10.5% of mototaxis. There were mainly minor injuries (48.7%), 27% of them requiring leaves of absence from work. There was an association between the days of work per week, fatigue in lower limbs and musculoskeletal complaints, and accidents. Knowledge of the working conditions and accidents involved in this activity can be of great importance for the adoption of traffic education policies, and to help prevent accidents by improving the working conditions and lives of these professionals.

Keywords: Occupational health. Working conditions. Occupational accidents. Traffic accidents. Occupational risks. Epidemiology.

Resumo

A utilização da motocicleta como meio de trabalho vem contribuindo para o aumento no número dos acidentes de trânsito e se constituindo em acidentes de trabalho para os mototaxistas. O objetivo deste estudo foi estimar a incidência anual de acidentes de trabalho entre mototaxistas cadastrados em Feira de Santana, BA. Trata-se de um estudo de caráter descritivo e censitário. Foram entrevistados 267 profissionais dos 300 cadastrados na Secretaria Municipal de Transporte e Trânsito – SMTT, através de questionário estruturado. Procedeu-se à análise descritiva e foram estimadas incidências anuais de acidentes de trabalho segundo as variáveis de interesse. Calcularam-se os riscos relativos e, como medida de significância estatística, utilizou-se o teste de qui-quadrado de Pearson e o teste exato de Fisher, adotando-se $p \leq 0,05$. Utilizou-se a regressão logística no intuito de realizar a análise simultânea das variáveis estudadas. Observou-se uma incidência anual de acidentes de trabalho de 10,5%. Ocorreram lesões leves, principalmente ferimentos (48,7%), sendo necessário afastamento das atividades laborais para 27% dos profissionais. Na análise de regressão logística verificou-se associação entre quantidade de dias de trabalho por semana, presença de fadiga em membros inferiores e queixa musculoesquelética e os acidentes de trabalho. O conhecimento acerca das condições de trabalho e dos acidentes envolvidos nessa atividade pode ser de grande importância para a adoção de políticas de educação no trânsito, com vistas à prevenção de acidentes e melhoria das condições de trabalho e de vida desses profissionais.

Palavras-chaves: Saúde do trabalhador. Condições de trabalho. Acidentes de trabalho. Acidentes de trânsito. Riscos ocupacionais. Epidemiologia.

Introduction

Violence is a public health problem in many countries. Each year, more than 1.6 million people lose their lives violently and countless others suffer non-fatal injuries, with a variety of physical, sexual, reproductive and mental problems deriving from it[1,2,3].

This issue has been related to the labor process since the moment in which the transformations that occurred in the production process amplified the spaces of professional exercise, expanding them to the streets. Such expansion also represented new exposures to risks or the intensification of exposures that already existed. The street, which used to be the space of the homework route, has become a working place, increasing the risk of traffic accidents and, consequently, constituting occupational accidents[4].

The significant increase in the number of traffic-related occupational accidents reflects both the reality of occupational accidents associated with urban violence and the casuistics of deaths due to external causes, in which traffic accidents are one of the main causes of violent deaths[1,5].

Traffic accidents, as causes of death of people while exercising their work, intertwine the labor world, in which degraded working conditions predominate, with the world of non-labor and urban violence, highlighting, among the affected workers, those involved in the informal labor market[6].

In Brazil, between 1991 and 2002, there was an increase of almost ten percent in the mean of the informal labor relations in metropolitan regions[7]. One of the main factors of concern deriving from this high degree of informality in Brazil is the fact that these workers do not have the benefits of the protection granted by the labor laws when they are victims of occupational accidents.

In the Brazilian informal labor market, one of the fastest growing occupations is that of professional motorcyclists, which encompasses mototaxi drivers and *motoboys*[8]. These workers are gradually occupying a sig-

nificant space in the transportation systems, mainly in small and medium-sized cities.

This professional activity represents an important survival option due to the autonomy in the performance of the activity and due to the reasonable possibility of income production. Mototaxi drivers are professionals who use motorcycles to transport passengers, and motoboys, to transport documents, valuables, goods and ordered articles.

Thus, the motorcycle, which used to be a type of vehicle used for leisure, has become a working tool due to its low acquisition and maintenance cost and because it is an alternative to fast movement in the chaotic traffic of the cities. This fact has been contributing to the increase in the statistics of traffic accidents, which constitute occupational accidents for professional motorcyclists[9].

Studies focusing on professional motorcyclists are scarce in the Brazilian scientific literature. Furthermore, they are mainly qualitative and analyze the work, accidents and effects on the health of motoboys[8,10,11,12].

Traffic accidents can cause physical and emotional injuries; consequently, they can cause withdrawal from work activities for mototaxi drivers and should be studied in the area of public health.

In this sense, it is important to investigate how these health problems are distributed, so that public policies of prevention, reduction in the number of accidents and health promotion can be developed to this new professional category.

The present study aimed to estimate the annual incidence of occupational accidents among mototaxi drivers registered in the city of Feira de Santana, state of Bahia (Northeastern Brazil).

Material and Methods

An inquiry about occupational accidents involving mototaxi drivers registered at *Secretaria Municipal de Transporte e Trânsito* (SMTT – Municipal Department of Transportation and Traffic) in the city of Feira de Santana, state of Bahia, was carried out.

The population of this study was composed of all the mototaxi drivers registered at SMTT, which constitutes a total of 300 (three hundred) professionals proportionally distributed in 20 (twenty) mototaxi stands in the city.

Initially, the information about the workers registered at SMTT and the venues of the mototaxi stands was surveyed through the Mototaxi Drivers Union. A pilot study was conducted through a health and work workshop, with the partnership between the Epidemiology Nucleus of *Universidade Estadual de Feira de Santana*-UEFS and the Mototaxi Drivers Union, in which there was the participation of 92 (ninety-two) mototaxi drivers.

In the execution of the research, all the mototaxi stands of the city were visited and the professionals who were there were invited to participate in the study. The questionnaires were administered upon the professionals' consent. In the cases in which, for some reason, the professionals were not at the stand on the day of the visit, new attempts to contact them were performed and they were considered losses only when they were not found on the third attempt.

The research instrument that was used was a form composed of blocks of questions corresponding to the following information: sociodemographic; general characteristics and working and health conditions; and occurrence of occupational accidents.

The term occupational accident, according to the Social Security, refers to accidents occurred at the working place during the execution of labor activities and/or while the worker is going to or returning from work, and to occupational diseases. They may cause body injuries or functional disorder, with the consequent loss or reduction (permanent or temporary) of labor capacity or even death[13].

To the evaluation of occupational accidents, we considered traffic accidents that occurred during work in the 12 previous months. In this study, traffic accident was considered any accident with a vehicle that occurred on the streets[14]. In addition,

the following aspects were evaluated: use of individual protection equipment in the moment of the accident, involvement of other victims, need of immediate medical assistance, presence of injuries and withdrawal from labor activities.

The race/color variable was self-reported. The professionals who classified themselves as black and mixed ethnicity (black and white) composed the group of black professionals, and the white, yellow and Indian professionals were grouped as non-blacks[15].

The data were tabulated and analyzed in the statistical program "Social Package for the Social Sciences – SPSS", version 10.0 for Windows, and in "R" - The R Foundation for Statistical Computing, version 2.2.1.

Initially, a descriptive analysis was performed to delineate the profile of the studied population according to sociodemographic and general characteristics, working and health conditions and occupational accidents.

The annual incidence was calculated by dividing the number of individuals who reported having suffered an occupational accident in the reference period by the total population of the study. The fact that the accidents are events circumscribed in time (short-duration events) allows to estimate incident cases based on information referred in the past[16,17].

The annual incidences of occupational accidents were estimated according to variables of interest. The relative risks were calculated and for the evaluation of statistical significance, Pearson's chi-square test and Fisher's exact test were used, adopting $p \leq 0.05$.

Logistic regression analysis was performed to evaluate the independent effect of the studied variables, in which a model containing occupational accident as the outcome and explanatory variables related to working and health characteristics and conditions was elaborated.

Initially, a pre-selection of the variables was carried out for inclusion in the logistic regression model. In this phase of the analysis, we observed the explanatory variables that presented p value obtained by the likelihood ratio test lower than or equal to 0.25, in univariate logistic regression analyses in which only the constant and one variable at a time were contained in the model.

After this stage, to obtain the final model, all the pre-selected variables were included in the analysis. The logistic regression analysis was performed adopting the stepwise forward procedure: we started with a model that contained only the intercept, the variables were included one at a time in the model, and we compared the estimates obtained from the model with and without the variable, through the likelihood ratio criterion. Using the same criterion, an interaction analysis was carried out with the variables of the final model. Based on the data obtained in the final logistic regression model, the relative risks were estimated and their respective confidence intervals were calculated, using procedures based on the Delta method[18,19].

The performance of the final model was evaluated by adopting different procedures: Hosmer-Le Cessie test, ROC curve and analysis of the patterns of co-variables. The Hosmer-Le Cessie test was used to test the null hypothesis according to which the model adjusted the data well, and the area beneath the ROC curve to evaluate the model's discrimination capacity[20]. The analysis of the influence of the patterns of co-variables was conducted with the purpose of identifying potentially influent patterns.

The present study followed the current recommendations referring to research involving human beings, according to Resolution 196/96 of the National Health Council. The project was approved by the Research Ethics Committee of *Universidade Estadual de Feira de Santana* – UEFS, protocol no. 018/2008 (CAAE 0018.0.059.000-08).

Results

The study investigated 267 professionals out of the 300 mototaxi drivers registered at the SMTT of the municipality (an 89%

response rate). Among the characteristics that were found, there was predominance of male individuals (99.3%), with mean age of 37.4 years (standard-deviation = 8.2 years), varying from 21 to 62 years. As for the mototaxi drivers' marital status, 66.3% were married or were in a stable union and 25.1% were single. The majority reported having children (77.6%) - 31.1% had only one child and 68.9% had two or more children. The majority of the workers reported black race/color (83.1%). The professionals' level of schooling was mainly elementary school (46.8%) and high school (52.8%), and only one professional reported higher education.

In relation to the professional characteristics, the majority had been in this profession for five or more years (68.9%) and had received the license to drive motorcycles five or more years before (85.4%). It was also observed that the majority of the professionals did not have another paid activity (89.5%) and did not contribute to the Social Security (76.8%). Concerning the monthly income, 49.4% of the professionals had an income of up to two minimum salaries and 50.6%, an income of three or more minimum salaries. The average income was R$ 992.80 (standard-deviation = R$ 399.10), varying from R$ 300.00 to R$ 3,500.00. As for the workday, the majority of the mototaxi drivers worked six to seven days per week (92.1%), during 8 or more hours per day (82.8%), which shows that it is a group of workers with a high daily working load and an extensive workday.

Regarding working and health conditions, the majority of the mototaxi drivers reported suffering from some kind of time pressure in their labor activity (71.2%) and from productivity requirement (80.1%). In relation to the presence of muscular fatigue at the end of the workday, this was reported by 45.3% in the upper limbs and 46.8% in the lower limbs. Presence of musculoskeletal complaint was reported by 30.7% of the professionals.

The annual incidence of occupational accidents was 10.5%. Among those who suffered accidents (n=28), 28.6% reported having suffered more than one accident in the 12 previous months of work, totaling 37 (thirty-seven) accidents in the studied period (Table 1). All the professionals alleged that they were using helmet when the accidents happened.

The majority of the accidents did not involve other victims and did not need immediate medical assistance. However, there were injuries in 75.7% of the accidents, with predominance of minor injuries (48.7%) and superficial traumas (21.6%) (Table 1). The

Table 1 - Characteristics of occupational accidents among motorcycle taxis registered. Feira de Santana, Bahia, 2009.

Tabela 1 - *Características dos acidentes de trabalho com mototaxistas cadastrados. Feira de Santana, Bahia, 2009.*

Variable (N)	n	%
Involvement of other victims (37)		
No involvement	25	67.6
Passenger	8	21.6
Pedestrian	4	10.8
Need of immediate medical assistance (37)		
No	26	70.3
Yes	11	29.7
Suffered some kind of injury (37)		
Yes	28	75.7
No	9	24.3
Withdrawal from work (37)		
No	27	73.0
Yes	10	27.0

body regions that were affected were the lower limbs (62.2%) and the upper limbs (37.8%).

Concerning withdrawal from labor activities, it was necessary for 27% of the injured individuals, and the median of the withdrawal time was 6.5 days, varying from 2 to 30 days.

No statistically significant association was observed between occupational accidents and the sociodemographic characteristics of the studied population. Nevertheless, higher annual incidences were observed among men aged 20 to 29 years (15.7%), with partner (11.9%), with two or more children (12.7%) and non-blacks (15.6%) (Table 2). There was no difference between the relative risks of the levels of schooling.

Individuals who had been in this profession for less time presented a higher annual incidence of accidents (13.3%), as well as those who had received their licenses to drive motorcycles less than 5 years before (12.8%), those who had another paid activity (14.3%), who did not contribute to the Social Security (11.2%), with monthly income of up to two minimum salaries (12.5%), who worked up to five days a week (23.8%), and whose workday was of 8 or more hours (11.8%) (Table 3). However, the observed differences were not statistically significant, except for the amount of working days per week. This result was unexpected, as the individuals who worked six to seven days a week would be more exposed to the risk of occupational accidents.

In relation to the working and health conditions, the annual incidences did not differ according to the level of pressure at

Table 2 - Incidence (%) of occupational accidents according to socio-demographic variables of motorcycle taxis registered. Feira de Santana, Bahia, 2009.

Tabela 2 - *Incidência (%) de acidentes de trabalho segundo variáveis sociodemográficas dos mototaxistas cadastrados. Feira de Santana, Bahia, 2009.*

Variable (N)	Occupational accidents			p value
	n	%	RR (95% CI)	
Age group (267)				
20-29 years (51)	8	15.7	1.81 (0.74-4.42)	0.30
30-39 years (104)	9	8.7	-	-
40 or + years (112)	11	9.8	1.13 (0.49-2.63)	0.95
Marital status (267)				
With partner (177)	21	11.9	1.52 (0.67-3.45)	0.41
Without partner (90)	7	7.8	-	-
Has children (267)				
Yes (207)	23	11.1	1.33 (0.53-3.36)	0.64
No (60)	5	8.3	-	-
Number of children (207)				
1 child (64)	5	7.8	-	-
2 or + children (142)	18	12.7	1.62 (0.63-4.18)	0.35
Race/color (267)				
Blacks (222)	21	9.5	0.61(0.27-1.34)	0.34
Non-blacks (45)	7	15.6	-	-
Level of schooling (267)				
Elementary school (125)	13	10.4	0.98 (0.49-1.99)	0.87
High School/Higher Education (142)	16	10.6	-	-

Table 3 - Incidence (%) of occupational accidents according to professional characteristics of motorcycle taxis registered. Feira de Santana, Bahia, 2009.

Tabela 3 - *Incidência (%) de acidentes de trabalho segundo características gerais dos mototaxistas cadastrados. Feira de Santana, Bahia, 2009.*

Variable (N)	Occupational accidents			p value
	n	%	RR (95% CI)	
Time in the profession (267)				
< 5 years (83)	11	13.3	1.43 (0.70-2.93)	0.44
≥ 5 years (184)	17	9.2	-	-
Number of working days/week				
Up to 5 days (21)	5	23.8	-	-
6 to 7 days (246)	23	9.3	0.39 (0.17-0.93)	0.05
Number of working hours/day (267)				
≤ 8 hours (46)	2	4.3	-	-
> 8 hours (221)	26	11.8	2.71 (0.66-11.00)	0.19
Time elapsed since receipt of license to drive motorcycles (267)				
< 5 years (39)	5	12.8	1.27 (0.51-3.14)	0.58
≥ 5 years (228)	23	10.1	-	-
Has another paid activity (267)				
Yes (28)	4	14.3	1.42 (0.53-3.80)	0.51
No (239)	24	10.0	-	-
Monthly income (267)				
Up to 2 MS (135)	12	8.9	-	-
≥ 3 MS (132)	16	12.1	1.36 (0.67-2.77)	0.51
Social Security (INSS) (267)				
Does not contribute to INSS (205)	23	11.2	1.39 (0.55-3.51)	0.64
Contributes to INSS (62)	5	8.1	-	-

work or productivity requirement (Table 4). Higher annual incidences were observed among those who reported muscular fatigue at the end of the workday in the upper limbs (12.4%) and lower limbs (16.0%) and musculoskeletal complaint (19.5%). Presence of fatigue in the lower limbs and musculoskeletal complaint presented a statistically significant association with the occurrence of occupational accidents.

The multiple logistic regression analysis included, in the final model, as variables associated with occupational accidents, presence of muscular fatigue in the lower limbs at the end of the day, musculoskeletal complaint, number of workdays per week and number of working hours per day (Table 5). Except for hours per workday, which was maintained in the model due to its importance in the study, the other variables were statistically associated with occupational accidents.

The mototaxi drivers who worked six to seven days a week presented lower annual incidence of occupational accidents (0.31 times), while the workers with fatigue in the lower limbs and musculoskeletal pain presented higher incidence (2.28 times and 2.77 times, respectively).

The Hosmer-Le Cessie test revealed p=0.36; therefore, it was possible to accept the hypothesis that the model adjusted well to the data. An area beneath the ROC curve = 0.73 was verified, which indicated that the model has a reasonable discriminatory power to evaluate cases and non-cases. In

Table 4 - Incidence (%) of occupational accidents according to professional characteristics of motorcycle taxis registered. Feira de Santana, Bahia, 2009.
Tabela 4 – *Incidência (%) de acidentes de trabalho segundo condições de trabalho e saúde entre mototaxistas cadastrados. Feira de Santana, Bahia, 2009.*

Variable (N)	Occupational accidents			p value
	n	%	RR (95% CI)	
Time pressure (267)	19			
Yes (190)	9	10.0	0.86 (0.40-1.81)	0.85
No (77)		11.7	-	-
Productivity requirement (267)				
Yes (214)	23	10.7	1.14 (0.45-2.86)	1.00
No (53)	5	9.4	-	-
Muscular fatigue in the upper limbs (267)				
Yes (121)	15	12.4	1.39 (0.69-2.81)	0.47
No (146)	13	8.9	-	-
Muscular fatigue in the lower limbs (N)				
Yes (125)	20	16.0	2.84 (1.30-6.22)	0.01
No (142)	8	5.6	-	-
Musculoskeletal complaint (267)				
Yes (82)	16	19.5	3.00 (1.49-6.07)	<0.01
No (185)	12	6.5	-	-

Table 5 - Crude and adjusted estimates by logistic regression analysis. Feira de Santana, Bahia, 2009.
Tabela 5 – *Estimativas brutas e ajustadas pela análise de regressão logística. Feira de Santana, Bahia, 2009.*

Co-variable	Crude RR	95% CI	p value	Adjusted RR	95% CI	p value
Muscular fatigue in the lower limbs	2.84	1.30-6.22	0.01	2.28	1.00-5.25	0.05
Musculoskeletal complaint	3.00	1.49-6.07	<0.01	2.77	1.28-6.00	0.01
Number of working days/week	0.39	0.17-0.93	0.05	0.31	0.12-0.80	0.02
Number of working hours/day	2.71	0.66-11.00	0.19	2.64	0.62-11.21	0.18

the analysis of the pattern of co-variables, no sufficiently influent observations were found for them to be excluded from the analysis.

Discussion

The paper approaches a theme that has been little studied in the literature so far, revealing the invisibility of this problem. This hindered the comparison of the findings with other studies. It is worth emphasizing that this is a recent profession, which partly justifies the existence of few studies.

In view of the type of study that was carried out, an inquiry, one of the limitations is that it does not clarify the temporal relationship that exists between events, that is, it only indicates the existence or not of an association between exposure and disease in the investigated population at a certain moment. Morbidity based on reported data has questionable validity, because it is subject to memorization errors, especially for less serious problems whose remembrance depends on the time of occurrence.

Another methodological limitation that should be taken into account is the small

number of individuals that were studied, which may have hindered the analysis and reduced the precision of the estimates. In relation to the studied population, it is important to mention the difficulties related to the obtention of accurate estimates of the number of professionals effectively working as mototaxi drivers. It is an activity performed by autonomous workers (constituted by one's own initiative); therefore, it is a group in which there may be frequent numeric fluctuations. In the specific case of the studied municipality (Feira de Santana), the profession is regulated; thus, its exercise is delimited by legal requirements (which includes register in the municipal government), which, in some way, may be a mechanism that regulates the increase in the number of workers. Additionally, it is important to mention that all the 20 mototaxi stands that exist in the city were visited continually throughout the data collection, enabling to compare the register list with the list of workers in activity. Thus, although the possibility that there is a higher number of workers than the one that was considered in the study cannot be discarded, it is probable that the number of workers defined as eligible is, in fact, representative of the set of mototaxi drivers in the studied place.

The professional activity of mototaxi driver is informal, which produces a high turnover of drivers. During the execution of the research, only the workers who were exercising the professional activity were interviewed; thus, the incidence of accidents might have been underestimated due to the well-known healthy worker effect, in which workers in activity would be healthier and fitter for work than those who are not inserted in the market due to occupational accidents, diseases or other types of problems. As traffic accidents may produce important sequels, including permanent work incapacity, and considering the high exposure of the higher and lower limbs in this activity, it is not possible to discard the possibility that workers who suffered serious injuries abandoned the profession and were not included in this study. The predominance of minor injuries among the reported accidents, observed in the study, strengthens the hypothesis that the serious accidents may not have been captured. Thus, the healthy worker effect (by means of which the healthier and those fitter for work remain active) may have influenced the results, and it should be considered in the analysis of the findings.

As for the job of professional motorcyclist, it was recently recognized by the federal government through the approval of the bill that regulates the exercise of professionals with the use of a motorcycle in the transport of passengers ("mototaxi drivers"), and in the delivery of goods and in the community street service ("motoboy") (Law 12.009 of July 29, 2009). Thus, in this study the term profession was used for the activity of mototaxi driver, as it is a term that is legally established in this job's regulation.

It is worth highlighting that, before this law was promulgated, this activity used to be regulated only in the municipal level in some Brazilian localities like Feira de Santana, whose mototaxi service was regulated in May 2001 with the purpose of supplementing the offer of the Municipal Transportation System (Law 2.244/20-01). An important finding that occurred after this regulation is that the fleet of motor vehicles increased by 419% between 2001 and 2009[21]. It is a profession that is exercised almost exclusively by married men with children and low level of schooling[22,23,24,25]. In relation to age, some studies have found a profile of younger professionals, unlike what was observed in the present study[18,19]. This shows that both young and older individuals, lacking professional training or high levels of schooling, search for this profession as a job option because they do not have the worker profile that is required by the formal job market. It is important to highlight that the age of the studied professionals was in accordance with the norm of the municipal government and also with the new federal law, as the drivers' minimum age was 21 years.

Among the sociodemographic charac-

teristics present in studies conducted with mototaxi drivers, race/skin color was not analyzed. In a study carried out with motoboys from the city of Salvador, state of Bahia (Northeastern Brazil), there was predominance of black-mixed ethnicity individuals, a characteristic that was similar to the one found in the present study[26].

The time of professional practice may have a direct relationship with the time during which the individual has been licensed to drive motorcycles, as individuals who have been in the profession for more time have been licensed for more time and, as was observed in this study, this fact shows the individuals' relative degree of professional experience in conducting the vehicle[25].

Studies carried out with mototaxi drivers have found that the majority of the professionals reported that they dedicate themselves exclusively to this activity and, therefore, do not have other paid activities, corroborating what was observed in the present study[22,23,24].

Mototaxi drivers are autonomous workers who exercise their profession informally, and the majority of them do not contribute to the Social Security[24]. Thus, when these workers are victims of occupational accidents, they do not have the benefits of the protection granted by the labor laws.

Remuneration emerges as a favorable condition to the exercise of the profession and represents a more profitable job alternative when compared to other types of jobs, mainly considering the worker's level of education, which prevents the insertion of these individuals in the formal job market[22,23].

The mototaxi activity requires great dedication of time with extensive workdays, as the majority of the professionals work almost all days in the week in an integral way[22,23,24,27]. Some characteristics are imposed on the daily routine of this profession, like time pressure and productivity requirement, which are also present in the motoboys' professional exercise[9,28,29].

Due to the long workdays and precarious working conditions, these professionals' body suffers damage, which can cause physical disturbances like presence of fatigue in the limbs and musculoskeletal complaint, corroborating the findings of many studies[6,9,22,25].

In relation to the occurrence of traffic accidents during work in the 12 previous months, an annual incidence of 10.5% was observed, and this figure was lower than the ones obtained in other studies. In the study by Lira[24], 20.4% of the mototaxi drivers regulated in the city of Fortaleza, Northeastern Brazil, referred they had been involved in traffic accidents in 2006 and 2007. Salim Filho[22] verified a participation in traffic accidents in the exercise of the activity in 63% in Castanhal (state of Pará, Northern Brazil) and in 51% in Tefé (state of Amazonas, Northern Brazil), and a significant portion of these workers had already been involved in more than one accident. Other studies conducted with mototaxi drivers have found that the majority of the professionals had already been involved in traffic accidents[23,27].

This incidence may be explained by the fact that the professional activity of the studied mototaxi drivers is regulated in the municipal level, and this fact requires compliance with requirements concerning their professional action and the vehicle's maintenance, under penalty of punishment. The fact that it is an autonomous activity, in which the professional depends on their own work to survive, may make the drivers be more careful in the performance of their activity.

Regarding the use of individual protection equipment, these professionals had considerable knowledge about the importance of the helmet; however, the other individual protection equipments are still largely unknown[24].

The majority of the traffic accidents did not involve other victims, and this datum was similar to the ones found in other studies with mototaxi drivers[22,24]. These data may have been under-recorded, as they demonstrate the reality of minor accidents, and the professionals may have denied this information so as not to lose their register.

Motorcyclists are more vulnerable to traffic accidents due to direct exposure during the impact with other vehicles or fixed objects and, therefore, they are subject to multiple injuries[30]. The majority of the accidents' victims reported that they suffered minor injuries and did not need immediate medical assistance. This result is similar to what has been observed in other studies[22,27].

The most affected body regions in accidents with motorcycles are the lower and upper limbs[31,32]. These regions are unprotected in the majority of the motorcyclists who neglect the utilization of individual protection equipment for these areas and who only use a helmet.

In relation to withdrawal from labor activities, the accidents caused mild and moderate impacts on these workers' professional activity, as they did not produce definitive sequels that could make them become incapable of work[22].

Concerning possible risk factors for occupational accidents, a statistically significant association was observed between working days and occurrence of accidents: those who worked up to five days per week reported suffering more accidents. This datum stimulates further analyzes focusing on this aspect. A possible explanation may be related to the small number of professionals who reported working up to five days a week (n=21). The small number of people in a stratum can establish inaccuracies in the measure of occurrence of an event, especially in comparative terms. Besides, it is not possible to discard here the possibility of reverse cause (the outcome interfering in the exposure): the mototaxi driver may have reduced the number of worked days because he suffered an occupational accident. The cross-sectional nature of the study limits more accurate explorations in this direction.

The physical wear that is present in these professionals' daily routine can reduce the reflexes, making the worker become more vulnerable to accidents. [9,24]. Presence of fatigue in the lower limbs and musculoskeletal complaint presented a statistically significant association with the occurrence of occupational accidents. These findings may also be explained by the precarious working conditions, as the mototaxi stands do not have an adequate space for resting and making a pause. Thus, when the workers are not transporting passengers, they cannot use the stands to rest and to recompose themselves from the postural efforts required in the performance of the labor activity.

Conclusion

The mototaxi driver activity absorbs a portion of the Brazilian population that has not had access to school and professional education and, for this reason, has not been able to enter into and remain in the formal job market, which favors the existence of this kind of informal work in developing countries like Brazil.

It is a profession with precarious working conditions, which requires long workdays with time pressure and productivity requirement. This can cause negative effects on these professionals' health.

The annual incidence of occupational accidents reached 10.5% of the mototaxi drivers, a result that may have been underestimated, as the professionals might have realized that reporting the occurrence of accidents can be interpreted as a form of unsafe transport, negatively impacting the demand for this kind of service. The fear of legal punishment is another element that may influence the report of accidents.

In this way, the knowledge brought by this study about the professional characteristics, working and health conditions and occupational accidents involved in this activity can be useful to the adoption of education policies in the traffic, aiming to prevent accidents and to improve the working and life conditions of these professionals.

References

1. Organização Mundial da Saúde. *Informe mundial sobre la violencia y la salud*. Washington, D.Cc: OMS; 2002.

2. Minayo MCS. A inclusão da violência na agenda da saúde: trajetória histórica. *Cien Saude Colet* 2007; 11: 1259-67.

3. Dahlberg LL, Krug ET. Violência: um panorama global de saúde pública. *Cien Saude Colet* 2007; 11: 1163-78.

4. Machado JMH, Gomez CM. Acidentes de trabalho: uma expressão da violência social**.** *Cad Saude Publica* 1994; 10: 74-87.

5. Souza NSS, Portinho BG, Barreiros MF. Acidentes de trabalho com óbito registrados em jornais no estado da Bahia. *Rev Baiana de Saude Publica* 2006; 30(1): 77-89.

6. Santana V, Nobre L, Waldvogel BC. Acidentes de trabalho no Brasil entre 1994 e 2004: uma revisão. *Cien Saude Colet* 2005; 10(4): 841-55.

7. Meneguin FB, Bugarin MS. A informalidade no mercado de trabalho e o impacto das instituições: uma análise sob a ótica da teoria dos jogos. *Econ Apl* 2008; 12(3): 341-63.

8. Silva DW, Andrade SM, Soares DA, Soares DFPP, Mathias TAF. Perfil do trabalho e acidentes de trânsito entre motociclistas de entregas em dois municípios de médio porte do Estado do Paraná, Brasil. *Cad Saude Publica* 2008; 24(11): 2643-52.

9. Oliveira NLB, Sousa RMC. Retorno à atividade produtiva de motociclistas vítimas de acidentes de trânsito. *Acta Paul Enferm* 2006; 19(3): 284-9.

10. Moraes TD. Fatores de risco de acidentes na atividade dos motoboys: limites das análises quantitativas. *Revista de Gestão Integrada em Saúde do Trabalho e Meio Ambiente* 2008; 3(3).

11. Grisci CLI, Scalco PD, Janovik MS. Modos de trabalhar e de ser de motoboys: a vivência espaço-temporal contemporânea. *Psicol Cienc Prof* 2007; 27(3): 446-61.

12. Silva DW, Andrade SM, Soares DA, Nunes EFPA, Melchior R. Condições de trabalho e riscos no trânsito urbano na ótica de trabalhadores motociclistas. *Physis* 2008; 18(2): 339-60.

13. Santana VS, Araújo-Filho JB, Albuquerque-Oliveira PR, Barbosa-Branco A. Acidentes de trabalho: custos previdenciários e dias de trabalho perdidos. *Rev Saude Publica* 2006; 40(6): 1004-12.

14. Organização Mundial da Saúde. *Classificação estatística internacional de doenças e problemas relacionados à saúde.* São Paulo: EDUSP; 2000.

15. Araújo EM, Costa MCN, Hogan VK, Mota ELA, Araújo TM, Oliveira NF. Race/skin color differentials in potential years of life lost due to external causes. *Rev Saude Publica* 2009; 43(3): 405-12.

16. Santana V, Maia AP, Carvalho C, Luz G. Acidentes de trabalho não fatais: diferenças de gênero e tipo de contrato de trabalho. *Cad Saude Publica* 2003; 19(2): 481-93.

17. Santana V, Itaparica M, Amorim AM, Araújo Filho JB, Araújo G, Oliveira M, Cooper S. Acidentes de trabalho não fatais em adolescentes. *Cad Saude Publica* 2003; 19(2): 407-20.

18. Oliveira NF, Santana VS, Lopes AA. Razões de proporções e uso do método delta para intervalos de confiança em regressão logística. *Rev Saude Publica* 1997; 31(1): 90-9.

19. Localio AR, Margolis DJ, Berlin JA. Relative risks and confidence intervals were easily computed indirectly from multivariable logistic regression. *J Clin Epidemiology* 2007; 60 (9): 874-82.

20. Hosmer DW, Lemeshow S. *Applied logistic regression.* 2nd. New York: John Wiley & Sons; 2000.

21. Denatran. Feira de Santana. Informações sobre frota de veículos. Disponível em http://www.denatran.gov.br/cidadesat. [Acessado em 11 de julho de 2009]

22. Salim-Filho MT. *Políticas Públicas e Trabalho no Transporte Alternativo na Amazônia-Mototáxi* [dissertação de mestrado]. Belém: Universidade Federal do Pará; 2007.

23. Silva RM. *Acidentes de trânsito com envolvimento de motociclistas: Uberlândia-2002-2004* [dissertação de mestrado]. Uberlândia: Universidade Federal de Uberlândia; 2007.

24. Lira SVG. *Comportamento preventivo e de risco no trânsito, referido por mototaxistas regulamentados em Fortaleza-CE* [dissertação de mestrado]. Fortaleza: Universidade de Fortaleza; 2008.

25. Matos RHF. *Estudo exploratório das relações de trabalho como fator de influência do comportamento humano no trânsito: caso do motofrete* [dissertação de mestrado]. Brasília: Universidade de Brasília; 2008.

26. Machado EP, Oliveira MA. O jogo de esconde-esconde – Trabalho perigoso e ação social defensiva entre motoboys de Salvador. *Rev Bras Ci Soc* 2009; 24(70): 91-184.

27. Oliveira DSC. *Análise dos impactos provocados pela operacionalização do serviço mototáxi no sistema de transportes urbanos: o caso de Campina Grande–PB* [dissertação de mestrado].João Pessoa: Universidade Federal da Paraíba; 2005.

28. Diniz EPH, Assunção AA, Lima FPA. Prevenção de acidentes: o reconhecimento das estratégias operatórias dos motociclistas profissionais como base para a negociação de acordo coletivo. *Cien Saude Colet* 2005; 10(4): 905-16.

29. Veronese AM, Oliveira DLLC. Os riscos dos acidentes de trânsito na perspectiva dos moto-boys: subsídios para a promoção da saúde. *Cad Saude Publica* 2006; 22(12): 2717-21.

30. Soares DFPP, Barros MBA. Fatores associados ao risco de internação por acidentes de trânsito no Município de Maringá-PR. *Rev Bras Epidemiol* 2006; 9(2): 193-205.

31. Oliveira NLB, Sousa RMC. Diagnóstico de lesões e qualidade de vida de motociclistas, vítimas de acidentes de trânsito. *Rev Latino-Am Enferm* 2003; 11(6): 749-56.

32. Pinto AO, Witt RR.Gravidade de lesões e características de motociclistas atendidos em um hospital de pronto socorro. *Rev Gaucha Enferm* 2008; 29(3): 408-14.

Received: 07/04/10
Final version: 29/07/11
Approved: 06/10/11