

# Moroccan Taxi Drivers Fatigue Using Pichot Questionnaire: A Cross-Sectional Survey

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**Abstract:** Studies conducted in many countries the world has shown that fatigued driving contributes to approximately 3%-30% of road accidents. We conducted this study to estimate the prevalence of fatigue among taxi drivers and to assess the determinant of fatigue among taxi drivers. In this cross-sectional study, 300 urban and rural taxi drivers from Fez, Morocco were enrolled from January to May 2013. The mean score of Pichot scale was  $13.59 \pm 8.23$ . The mean duration of sleep was  $6.78 \pm 1.47$  h per day. The mean rate of accident was  $2.78 \pm 1.12$  per year. At the final model of the multiple linear regression we found an association statistically significant between Pichot scale and income, cardiovascular disorders, tobacco use, problems with colleagues, regularity of sleep and sleeping at the wheel. This study opened the door to many discussions about the professional drivers' conditions of work and we can argue that we should ameliorate the professional drivers conditions of work in Morocco.

**Key words:** Fatigue, Pichot scale, taxi drivers, Morocco.

## 1. Introduction

Fatigue is a state of tiredness which can perturb a person attention and ability to take good decision [1-4]. And hence driving when fatigued can make the driver falling asleep and as consequence the risk of accident may be very high. We can easily understand that driving when fatigued causes thousands of road traffic accidents and fatalities each year. Many international studies found that fatigue can be a probable major cause of truck driver accidents (about 20% to more than 50%) [5-7]. Studies conducted in many countries the world has shown that fatigued driving contributes to approximately 3%-30% of road accidents [12].

The World Health Organization estimates that by 2020 road traffic injuries will represent the third major cause of disability adjusted years of life lost worldwide [13]. In Morocco, according to statistics of the Ministry of equipment, transport and logistics, the

number of accidents has reached 35.769 between January and June 2015. The official statistics reported 4.364 serious injuries and 46.401 slightly injured [13]. And the sector of transport and especially taxi transport is very informal and there are no official guidelines on the work hours and rest periods of taxi drivers. Since fatigued driving continues to threaten thousands of citizens and professionals lives.

Despite the importance of quality of sleep in drivers, there were few researches concerning this topic in Morocco. We conducted this study to estimate the prevalence of fatigue among taxi drivers and to assess the determinant of fatigue among taxi drivers.

## 2. Materiel and Methods

In this cross-sectional study, 300 urban and rural taxi drivers from Fez, Morocco were enrolled from January to May 2013. All interviews were performed by two trained investigators. First all items on the questionnaire were explained to and discussed with the participants, and their questions were answered as they filled out the forms.

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The questionnaire includes socio-demographic data, medical problems, such as diabetes, cardiovascular problems or pulmonary disorders, addiction including tobacco, water pipe, alcohol or drug, sleep habits and different kind of stress. All drivers under study also completed forms to evaluate their fatigue using Pichot questionnaire [11]. Pathological tiredness is referred to when people find it harder to carry out their daily activities than in their usual condition. Pichot's subjective scale has been proposed to assess the importance of this handicap. Pichot's scale consists of eight questions and yields a score of 0 to 32. It is easy to administer and is currently one of the most widely used for tiredness.

All variables were summarized by using descriptive statistics. Categorical variables were described in terms of proportions and quantitative variables were described in terms of average extreme values and standard deviation.

The association between dependent variable Pichot's scale and several potential explanatory variables was investigated. Bi-variate analysis was used and the association between the quantitative variable (Pichot's scale) and many qualitative variables (sex, tobacco use...) was searched by *t*-test and was selected as the significance level a *P* value of 0.05. The association between the dependent variable (Pichot's scale) and quantitative variables was searched by simple linear regression and was selected as the significance level a *P* value of 0.05.

Multivariate analysis was made (multiple linear regression), the dependent variable was Pichot's scale and we include in the model all the explanatory variables which have a significance level at the bivariate analysis less or equal 0.20

Statistical analysis was done on SPSS Version 17.

### 3. Results

All participants were male and their mean age was  $42.51 \pm 10.81$  (range 18-74) years. In terms of marital status, 45 (15.0%) were single, 255 (84.7%) were

married, and 1 (0.3%) was divorced and no one widowed. The mean BMI of the drivers was  $26.81 \pm 4.31$  kg/m<sup>2</sup>. The self-report of associated diseases indicated heart disease in 4 (1.3%), COPD in 1 (0.3%), diabetes in 18 (6.0%), other disease in 17 (15.6%). In their history of drug abuse 97 (32.1%) used tobacco, 15 (5.0%) had alcohol abuse with mean duration of alcohol abuse  $1.4 \pm 4.1$  (range 0-31) and 25 (8.3%) had a history of drug abuse. Our study population reported coffee and tea consumption respectively 230 (76.2%) and 224 (74.2%). Finally, 100 (33.2%) drivers had regular physical activity.

Their experience in driving was  $8.34 \pm 3.56$  years on average. 7 (2.3%) drivers were used to work by night, 172 (57.1%) were used to work during the day and 122 (40.5%) worked both during the day and by night Table 1.

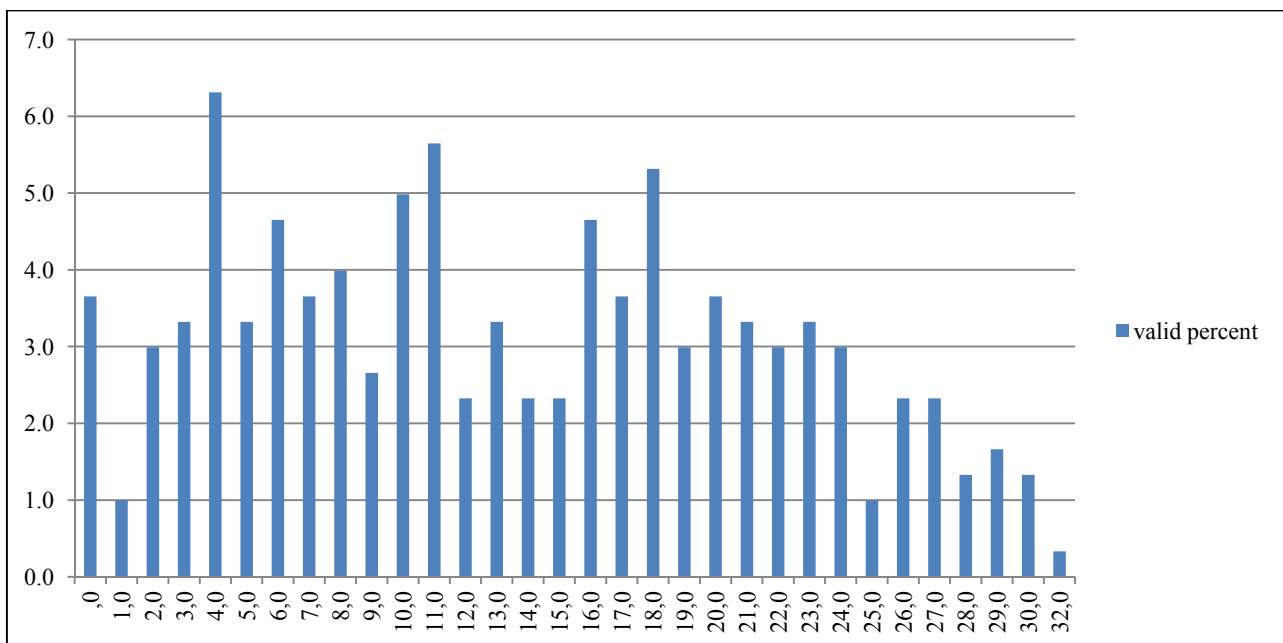
The mean score of Pichot scale was  $13.59 \pm 8.23$  (range from 0 to 32) Figure 1. The mean duration of sleep was  $6.78 \pm 1.47$  h per day. The mean rate of accident was  $2.78 \pm 1.12$  per year. We found a the simple linear regression significant association with Pichot scale and age ( $P \leq 0.001$ ), marital status with not married Vs married ( $P = 0.004$ ), income with medium or high Vs low ( $P = 0.008$ ), diabetes with diabetes patients Vs subjects without diabetes ( $P = 0.008$ ), cardiovascular disorders with cardiovascular disorder patients Vs subjects without cardiovascular disorders ( $P \leq 0.001$ ), respiratory disorders with patients with respiratory disorders Vs patients without respiratory disorders ( $P \leq 0.000$ ), tobacco use with subject who didn't use tobacco Vs subjects who used tobacco ( $P = 0.035$ ), alcohol use with subject who used alcohol Vs subject who didn't use alcohol ( $P = 0.014$ ), coffee consumption with subject who used coffee Vs subject who didn't use coffee ( $P = 0.012$ ), problems with colleagues with subjects who didn't have problems with colleagues Vs subject who had problems with colleagues ( $P \leq 0.000$ ), problems with clients with subjects who didn't have problems with clients Vs subject who had problems with clients ( $P =$

0.025), regularity of sleep with subject who didn't have regular sleeping Vs subject who had regular sleeping ( $P = 0.002$ ), sleeping at the wheel with subject who didn't sleep at the wheel Vs subject who slept at the wheel ( $P = 0.002$ ), road accidents with subject who

never had accident last year Vs subject who had at least one accident last year ( $P \leq 0.000$ ), deflection of the car with subject who never had car deflection with subject who had car deflection before ( $P = 0.001$ ) Table 2.

**Table 1** Descriptive data of the taxi drivers.

	Frequency (%)	Mean $\pm$ SD
Age in years (n = 300)		48.2 $\pm$ 10.8
Driving experience in years (n = 300)		8.3 $\pm$ 3.5
Working time (n = 300)		
Daily	172 (57.1%)	
By night	7 (2.3%)	
Both	122 (40.5%)	
Marital status (n = 300)		
Single	45 (15.0%)	
Married	255 (84.7%)	
Divorced	1 (0.3%)	
Widowed	0 (0.0%)	
BMI(Kg/m <sup>2</sup> ) (n = 294)		26.8 $\pm$ 4.3
Heart disease (n = 300)	4 (1.4%)	
COPD (n = 250)	1 (0.4%)	
Diabetes (n = 300)	18 (6.0%)	
Other diseases (n = 109)	17 (15.6%)	
Tobacco use (n = 300)	97 (32.2%)	
Alcohol abuse (n = 300)	15 (5.0%)	
Drug abuse (n = 300)	25 (8.3%)	
Coffee consumption (n = 300)	230 (76.2%)	
Tea consumption (n = 300)	224 (74.2%)	
Regular physical activity (n = 300)	100 (33.2%)	



**Fig. 1** Distribution of participants according to the Pichot scale.

**Table 2 Pichot scale and associated factors (Simple Linear Regression).**

	B	IC (95%)	p
Age	0.226	[0.008; 2.570]	0.000
Marital status			
Not married	0.165	[1.203; 6.294]	0.004
Married	1	-	
Income	1	-	
Low income			
Medium or high income	-0.158	[-0.003; 0.000]	0.008
Diabetes			
Yes	0.152	[0.801; 5.374]	0.008
No	1	-	
Cardiovascular disorders			
Yes	0.300	[4.330; 9.247]	0.000
No	1	-	
Respiratory disorders			
Yes	0.279	[4.484; 10.274]	0.000
No	1	-	
Tobacco use			
Yes	1	-	
No	-0.122	[-3.084; -0.111]	0.035
Alcohol use			
Yes	0.142	[0.553; 4.872]	0.014
No	1	-	
Coffee consumption			
Yes	-0.145	[-5.023; -0.615]	0.012
No	1	-	
Problems with colleagues			
Yes	1	-	
No	-0.219	[-6.132; -2.007]	0.000
Problems with clients			
Yes	1	-	
No	-0.129	[-4.086; -0.272]	0.025
Regularity of sleep			
Yes	1	-	
No	0.181	[1.142; 4.825]	0.002
Sleeping at the wheel			
Yes	1	-	
No	-0.200	[-5.426; -1.235]	0.002
Road accident last year			
Yes	1	-	
No	-0.230	[-5.614; -1.966]	0.000
Deflection of the car			
Yes	1	-	
No	-0.185	[-5.020; -1.234]	0.001

At the final model of the multiple linear regression we found an association statistically significant between Pichot scale and income ( $P = 0.017$ ), cardiovascular disorders ( $P \leq 0.001$ ), tobacco use ( $P = 0.010$ ), problems with colleagues ( $P = 0.002$ ), regularity of sleep ( $P = 0.013$ ) and sleeping at the wheel ( $P = 0.002$ ) Table 3.

#### 4. Discussion

In this cross-sectional study, 300 urban and rural taxi

drivers from Fez, Morocco were enrolled from January to May 2013. We conducted this study to estimate the prevalence of fatigue among taxi drivers and to assess the determinant of fatigue among taxi drivers.

In this study we found that low income, cardiovascular disorders, tobacco use, problems with colleagues, regularity of sleep and sleeping at the wheel. In our study we found various possible causes of fatigue among taxi drivers in Morocco. The level of

**Table 3 Pichot scale and associated factors (Multiple Linear Regression).**

	B	Adjusted IC (95%)	p
Income	1	-	
Low income			
Medium or high income	-0.128	[-0.030; 0.000]	0.017
Cardiovascular disorders			
Yes	0.223	[2.602; 7.365]	0.000
No	1	-	
Tobacco use			
Yes	1	-	
No	-0.141	[-3.142; -0.439]	0.010
Problems with colleagues			
Yes	1	-	
No	-0.165	[-4.869; -1.066]	0.002
Regularity of sleep			
Yes	1	-	
No	0.135	[0.468; 3.908]	0.013
Sleeping at the wheel			
Yes	1	-	
No	-0.243	[-5.837; -2.248]	0.000

income was associated with fatigue among our study population. We can easily explain this by the fact that many drivers have low income in Morocco and when they try to ameliorate their revenues they have to work for many continuous hours during the day and sometimes the night without having enough rest. Actually many studies found that the occupational stress can be related to some unfavorable job outlook, low income, lack of prestige, and underprivileged position [14]. According to many articles, Irregular sleeping habits and excessive stress are risk factors for fatigue (15). In our study, we searched many stress causes (as we have questions about the participant problems with clients, colleagues or authority) and we found that the problems with colleagues were associated with excess of fatigue. It's well known that stress can influence a person regularity of sleepiness and hence with a work which required many hours of concentration it can generate signs of fatigue. Many professional drivers have been sleeping at the wheel, but there is no significant increase in road accident related to fatigue.

This study revealed that some diseases like cardiovascular diseases can be associated to excess of tiredness among professional drivers. This is online with many reports which showed that professional drivers have a higher chance of developing

cardiovascular diseases because of the greater psychiatric pressure in their working situations or their high workloads that include driving in heavy traffic, obesity, low physical activity, high demand and low decision latitude [16-18].

It's well-known that fatigue and the quality of sleep can affect the driver skills [19]. But the direct association between both fatigue and sleep disorder on one hand and the professional drivers' performance on the second hand is a topic under research [20-24]. Sleep deprivation can cause the vigilance and concentration decrease [25]. Pichot questionnaire is one of the most widely used questionnaires to assess fatigue among people. In this study we used this questionnaire to assess fatigue among healthy people (professional drivers) which can influence negatively their ability and can cause road accidents.

As limits of this study, we can imagine that the relationship between fatigue and car accidents can be biased by many confounders, however in this survey we tried to cover most of the suspected factors and neutralize their effect by multivariate analysis. In Morocco many women drive their cars but no women are working as professional taxi drivers and hence in this study all participants were men and inter-gender comparisons were not possible. And the other limits of our study are the classic limits of

cross-sectional studies like the difficulty to make causal inference. However, it was a pioneer study this is why we conducted a Cross-sectional study in order to give us a quick picture of the situation. These first results have to be confirmed by other epidemiological studies.

In the future, we recommend that many prevention programs should be developed including educational sessions for professional drivers with awareness sessions about using the rest areas. In addition, legislative or regulatory initiatives should also be discussed [26]. This study opened the door to many discussions about the professional drivers' conditions of work and we can argue that we should ameliorate the professional drivers conditions of work in Morocco.

## 5. Ethical Aspect

This study has been presented to the local ethics committee of University Hospital Hassan II of Fez who agreed it. This survey was classified as minimal risk research.

An oral informed consent has been taken from all participants after full explanations of the study and the participants' rights and before collecting any data. Questionnaires have been assigned a unique number and at any time during the analysis of the study no person had been cited in order to respect the confidentiality and the privacy of all participants.

## 6. Authors Contribution

NadiaBENAICHA: Conducting the survey, Statistical Analysis, Writing the article

Abdessalam DIARA: Statistical analysis

OussmaneSY: Statistical analysis

OussmaneDésiré DIAKITE: Statistical analysis

Adil NAJDI: Conducting and supervising the survey, reviewing the article

Mohamed Amine BERRAHO: Writing the protocol, writing the questionnaire, reviewing the Consent Form, reviewing the article

## 7. Acknowledgments

We thank the participants who accepted to answer the questions.

## 8. Competing Interest

The authors declare they have no competing interest.

## 9. Funding

The authors didn't have any funding for this survey.

## 10. Availability of Data and Materials

Data will not be shared: Having collected the data, our team wants to be the one to analyze it and to benefit from it. Other article about some other aspects of this study will be published. Once, all papers published, we can share our database.

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